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Langley, A., Lindberg, K., Mørk, B. E., Nicolini, D., Raviola, E., & Walter, L. (2019). Boundary Work among Groups, Occupations, and Organizations: From Cartography to Process. *Academy of Management Annals*, 13(2), 704-736. <https://doi.org/10.5465/annals.2017.0089>

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Boundary Work among Groups, Occupations and Organizations: From Cartography to Process

Journal:	<i>Academy of Management Annals</i>
Manuscript ID	ANNALS-2017-0089.R4
Document Type:	Article
Keywords:	POWER AND POLITICS, design < ORGANIZATION, CONFLICT, COORDINATION, INTERGROUP RELATIONS, INTERORGANIZATIONAL RELATIONS

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3 **Boundary Work among Groups, Occupations and Organizations:**
4 **From Cartography to Process¹**
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May 2019

**Boundary Work among Groups, Occupations and Organizations:
From Geography to Process**

ABSTRACT

This article reviews scholarship dealing with the notion of “boundary work,” defined as purposeful individual and collective effort to influence the social, symbolic, material or temporal boundaries, demarcations and distinctions affecting groups, occupations and organizations. We identify and explore the implications of three conceptually distinct but inter-related forms of boundary work emerging from the literature. *Competitive* boundary work involves mobilizing boundaries to establish some kind of advantage over others. In direct contrast, *collaborative* boundary work is concerned with aligning boundaries to enable collaboration. Finally, *configurational boundary work* involves manipulating patterns of differentiation and integration among groups to ensure that certain activities are brought together while others are kept apart, orienting the domains of competition and collaboration. We argue that the notion of boundary work can contribute to the development of a uniquely processual view of organizational design as open-ended, and continually becoming, an orientation with significant future potential for understanding novel forms of organizing, and for integrating agency, power dynamics, materiality, and temporality into the study of organizing.

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3 In line with the practice turn in organization and management theory (Nicolini, 2012;
4 Schatzki, Knorr-Cetina, & Von Savigny, 2001), the notion of “boundary work” refers to purposeful
5 individual and collective effort to influence the social, symbolic, material or temporal boundaries,
6 demarcations and distinctions affecting groups, occupations and organizations (Lamont & Molnár,
7 2002; Phillips & Lawrence, 2012). Boundary work is important because of its consequences for
8 the dynamics of collaboration, inclusion and exclusion that can in turn influence work practices,
9 learning and effectiveness in and around organizations (Lindberg, Walter, & Raviola, 2017; Mørk,
10 Hoholm, Maaninen-Olsson, & Aanestad, 2012; Yagi & Kleinberg, 2011; Zietsma & Lawrence,
11 2010). Boundary work also contributes to the maintenance or disruption of power relations among
12 groups, organizations and society more generally (Allen, 2000; Arndt & Bigelow, 2005; Barrett,
13 Oborn, Orlikowski, & Yates, 2012; Bucher, Chreim, Langley, & Reay, 2016).

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The notion of “boundary work” was originally coined by Gieryn (1983) to describe the discursive strategies used by scientists to demarcate science from non-science. Though initially slow to develop, in the last decade, scholarship adopting the notion of “boundary work” has burgeoned,² with researchers applying it to multiple levels of analysis (individual, group, organizational, occupational, institutional), using multiple conceptions of the notion of “work” (discursive, or practice-based), and developing a range of typologies to describe this work, its triggers and its consequences. Yet, so far, an integrated synthesis of this literature is missing.

The purpose of this review is therefore (1) to clarify the distinctive contribution of the notion of boundary work to organization theory; (2) to distinguish different types of boundary work, their triggers and consequences; and (3) to build on and reach beyond existing scholarship to suggest directions for future research. We argue based on this review, that the notion of

² Over 70% of the articles included in our study were published in or after 2008.

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3 boundary work can contribute to improving the way we address difference, conflict, collaboration
4 and integration in organizations. The notion of boundary work can also contribute to the
5 development of a uniquely processual view of organizational design, with significant potential for
6 understanding novel forms of organizing, and for integrating agency, power dynamics, materiality,
7 and temporality into the study of organizing (Weick, 1979).
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10 We begin by specifying the nature of the boundary work concept, distinguishing it from
11 related concepts and phenomena, and explaining the scope and methodology for our review. We
12 then introduce three conceptually distinct but inter-related forms of boundary work emerging from
13 our review that we label “*competitive* boundary work,” “*collaborative* boundary work,”³ and
14 “*configurational* boundary work”. In the main body of the paper we explore and assess the
15 literature dealing specifically with these forms and draw out key insights and opportunities for
16 future development. We follow this with a broader discussion of the potential for integrating the
17 insights from the three bodies of literature, as well as for developing the notion of boundary work
18 in new directions.
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35 **Scope and methodology**

36 To develop this article, we began by searching for articles and books using the notion of
37 “boundary work” in their abstract, title or keywords in Google Scholar, the Web-of-Science and a
38 selection of top management journals⁴. To be included, articles and other texts had to deal with
39 issues relevant to organization and management theory. Distilling usage from the existing literature
40 and as sketched above, we define boundary work here as *purposeful individual and collective*
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52 ³ The term “collaborative boundary work” was first coined to our knowledge by Quick and Feldman (2014).

53 ⁴ These journals were *Administrative Science Quarterly*, *Academy of Management Journal*, *Academy of*
54 *Management Review*, *Academy of Management Annals*, *Organization Science*, *Organization Studies*, *Organization*,
55 *Human Relations*, *Journal of Management Studies*, *Journal of Management Inquiry*, *Strategic Organization*
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3 *effort to influence the social, symbolic, material and temporal boundaries, demarcations and*
4 *distinctions affecting groups, occupations and organizations.* This definition offers a processual
5
6 constructivist view of boundaries as in flux, as continually becoming (Langley & Tsoukas, 2017)
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8 and as subject to human agency, something that is not always reflected in other related concepts
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10 (e.g., boundary spanning, boundary objects), where the pre-existence of boundaries as fixed
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12 elements of structure tends to be assumed.
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17 Note here that the reference in our definition to “symbolic” and “social” boundaries is
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19 inspired by Lamont and Molnár’s (2002) discussion of the nature of boundaries in the social
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21 sciences. “Symbolic boundaries” are socially constructed interpretive distinctions concerning
22
23 concepts (e.g., distinctions between what is or is not scientific, legal, or ethical) which may or may
24
25 not be embodied in distinctions among social groups. In many cases however, symbolic
26
27 distinctions also come to be attached to social boundaries including certain people and excluding
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29 others, as in the case of professions or occupations. Other authors have added different types of
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31 boundaries to the mix. For example, Hernes (2004) adds reference to physical boundaries,
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33 incorporating the notion of spatial separation, and thus the role of materiality which we have thus
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35 also included in our definition. Other authors introduced the notion of “temporal boundaries,”
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37 (Bucher & Langley, 2016; Orlikowski, 2002; Stjerne & Svejenova, 2016) concerned with specific
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39 time periods, suggesting a need to include this in the definition as well.
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45 Our definition helped us specify the scope of relevant literature in two directions: first in
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47 terms of the level of analysis (collective rather than individual) and second in terms of the notion
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49 of work as involving ongoing activities or sets of practices. In our initial review we noted that
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51 several scholars use the notion of “boundary work” to refer specifically to intra-individual
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53 boundaries (e.g., work-home life role demarcation) (Ashforth, Kreiner, & Fugate, 2000; Nippert-
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3 Eng, 1995/2008). Given our interest in boundary work at the collective level, we decided to
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5 exclude this body of work for the purposes of this review since the processes in play are quite
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7 different, deserving separate attention.
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10 We also note that there are some adjacent concepts, such as boundary spanning, and
11
12 boundary objects, that are often studied without any reference to “boundary work” per se. On close
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14 analysis, a subset of these studies do in fact address practices of boundary work as we have defined
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16 them without using this specific term, and we have therefore analysed some significant examples
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18 under the heading “adjacent literature” in our review. However, the majority of studies referring
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20 to such adjacent concepts were considered outside the scope of the review because they do not
21
22 view boundaries as subject to human agency. For example, most studies on “boundary spanning”
23
24 generally take for granted the existence of well-defined and immutable boundaries, and focus on
25
26 “actions to establish linkages and manage interactions with parties in the external environment,”
27
28 where the external environment is seen as lying beyond those boundaries (Marrone, 2010, p. 914).
29
30 In contrast, studies mobilizing the notion of “boundary work” problematize boundaries by
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32 conceptualizing their creation, maintenance, blurring and transformation as the target of purposeful
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34 action. Since the different bodies of literature are not entirely disjoint, in the review that follows,
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36 we do pay some attention to adjacent literatures to ensure coverage of relevant concepts and ideas.
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38 Nevertheless, our investigation of the literature and previous reviews on related topics suggests
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40 that there is a unique and important body of scholarship drawing on the notion of boundary work
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42 as we have defined it that has not previously been the subject of a major synthesis.
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49 With these delimitations, there remain 160 relevant articles in the corpus. These studies
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51 deal with boundary work in relation to social, symbolic, material and temporal boundaries
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53 affecting groups, occupations and organizations. As a first step in analyzing our corpus, we
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3 selected and read in depth 15 articles from our initial search, chosen because they appeared
4 influential and were published in management and organization journals. As an author team, we
5 then discussed similarities and differences between the articles and identified seven emergent
6 themes that would enable us to richly analyse the entire corpus. These themes were then used to
7 code each article from the corpus in a one-page table. Five of the themes we used were empirically-
8 based (the site of boundaries; who is involved; triggers; activities of boundary work; and
9 consequences). The other two codes focused on theoretical grounding and methodologies
10 respectively. As we coded, we began to notice that articles focused on three somewhat different
11 empirical phenomena, depending on who the boundary-workers were, their positioning with
12 respect to boundaries-in-the-making, and the implied purpose of boundary work. These empirical
13 differences were also associated with the use of somewhat different theoretical lenses. We
14 therefore decided to orient our analysis around the three categories labeled competitive,
15 collaborative and configurational boundary work as indicated above.
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33 In a second step, we classified the coded articles into the three categories. Each article was
34 reread and discussed by at least three authors. Given the large number of articles examined overall,
35 it was not possible to be exhaustive within the text of this review. We therefore selected the most
36 relevant articles for each category for more detailed discussion in the current paper. The criteria at
37 this stage included coverage of seminal work, the inclusion of articles using different theoretical
38 perspectives and contexts, and the centrality of the themes studied to the field of management and
39 organization studies. The selected articles are summarized in Appendices 1, 2 and 3 in the
40 supplementary materials. We focused specifically on 29 articles illustrative of competitive
41 boundary work, 25 articles illustrating collaborative boundary work and 18 illustrating
42 configurational boundary work.
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3 As a third step, we constructed sub-categories of each main category, focusing on how
4 different types of boundary work are performed. We then assessed the contributions of each
5 category to the study of boundary work, and identified future research directions. In Table 1, we
6 summarize the three types of boundary work used to structure the overall review.
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12 *Insert Table 1 here*
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14 The first and largest category labeled “competitive boundary work” (or work *for*
15 boundaries) groups together studies that focus on how people construct, defend or extend
16 boundaries to distinguish themselves from others, by defining an exclusive territory (e.g., such as
17 a profession) that appears to confer some kind of advantage. We use the label “competitive” to
18 refer to the self-oriented nature of this kind of boundary work, which construes boundaries or
19 distinctions as mechanisms for acquiring resources or reproducing power, social position and
20 status for those who engage in it (Bourdieu, 1977).
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30 The second category labeled “collaborative boundary work” (or work *at* boundaries)
31 considers how people draw on, negotiate, blur or realign boundaries in interaction with others in
32 order to collaborate, coordinate or to get everyday work done (Strauss, 1978). This category of
33 studies recognizes that boundaries may contribute to facilitating coordination, while concurrently
34 requiring people to engage in practices to connect or productively align their differences.
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42 The third and final category shifts the locus of agency to a higher level. What we call
43 “configurational boundary work” (or work *through* boundaries) considers how people work from
44 outside existing boundaries to design, organize or rearrange the sets of boundaries influencing
45 others’ behaviors. This category focuses on how patterns of differentiation and integration among
46 sets of people within or around organizations may be reconfigured to ensure that certain activities
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3 are brought together within bounded spaces, while others are at least temporarily kept apart, for
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5 the purpose of producing particular kinds of collective action.
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8 For each of the three streams of literature reviewed, we begin by tracing its historical roots.
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10 We then examine the main modes of boundary work emerging in this particular stream. This is
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12 followed by an assessment of key contributions and limitations. Here we identify the main insights
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14 of the studies reviewed in each stream, and then raise a series of more critical concerns and
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16 emergent opportunities under two main subheadings: one focusing on the nature and dynamics of
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18 this type of boundary work (i.e., its central tendencies), and the other on variations, more
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20 specifically what we know and do not know about the contingencies and consequences of this type
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22 of boundary work. This analysis will set the scene for our later discussion where we examine how
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24 the three streams of literature and the different types of boundary work they describe intersect and
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26 interact, and we point to some overarching directions for future development.
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31 **Competitive Boundary Work: Working *for* Boundaries**

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34 “Competitive boundary work” (or work *for* boundaries) focuses on how people defend,
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36 contest and create boundaries to distinguish themselves from others to achieve some kind of
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38 advantage. Boundary relations here are often constructed as a dichotomy that assigns superior
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40 legitimacy and power to the favored side while excluding the other. This is manifested, for
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42 example, in studies of how scientists do boundary work to distinguish themselves from non-
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44 scientists (Garud, Gehman, & Karunakaran, 2014; Gieryn, 1983; Murray, 2010), how groups or
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46 organizations do boundary work to define legitimate membership and exclude others (Ashuri &
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48 Bar-Ilan, 2016; Edlinger, 2015; Mikes, 2011; Santos & Eisenhardt, 2005), and how professions do
49
50 boundary work to defend, extend or maintain their jurisdictions (Allen, 2000; Bach, Kessler, &
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52 Heron, 2012; Burri, 2008; Hazgui & Gendron, 2015). The self-defined boundaries of inclusion are
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3 in a sense paradoxical because inclusion cannot be defined without its opposite (the “other”), with
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5 the result that others may well push back, potentially leading to boundary struggles or contests
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7 (Bucher et al., 2016; Ezzamel & Burns, 2005; Lefsrud & Meyer, 2012).
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10 **Historical roots and adjacent literatures**

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12 Grounded in the social studies of science, Gieryn’s (1983) oft-cited work clearly lies at the
13
14 foundation of this stream. Drawing on classic texts by both individual scientists (e.g., John
15
16 Tyndale) and scientific institutions (the National Academy of Science), Gieryn (1983) argued that
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18 the rhetorical demarcation of science from non-science (achieved, for example, by discursively
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20 emphasizing ideological elements such as rigor, objectivity, and reliance on causal principles),
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22 allowed scientists to defend their intellectual territory and to maintain their position of expertise,
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24 authority and credibility against the competing claims of religion, engineering, and so-called
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26 “pseudo-sciences” (such as phrenology). Gieryn (1983, p. 781) thus highlighted the fluid and
27
28 negotiated character of the concept of science: “*Science’ is no single thing: its boundaries are*
29
30 *drawn and redrawn in flexible, historically changing and sometimes ambiguous ways.*” Indeed,
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32 he used the term boundary work⁵ precisely to emphasize the ongoing rhetorical and discursive
33
34 drawing of distinctions, denying the possibility that science could be defined once and for all, but
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36 appreciating the powerful situated effects of such discursive demarcations.
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42 Gieryn (1983, p. 792) further argued that “*the utility of boundary work is not limited to*
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44 *demarcations of science from non-science.*” Indeed, he contributed to seeding the stream of
45
46 scholarship discussed in this section by suggesting that the concept could be seen as a generic
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48 feature of professionalization, associated with *expanding* authority into other domains,
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54 ⁵ Gieryn (1983, footnote on p. 781) mentions that the term ‘boundary work’ was suggested to him by Steve Woolgar
55 in 1981.
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3 *monopolizing* professional authority by excluding rivals or outsiders, and *protecting* professional
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5 autonomy. In doing so, Gieryn's work also connects with adjacent literatures on the system of
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7 professions spawned by Abbott's (1988, 1995) classic work, and in particular with contributions
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9 focusing on jurisdictional battles, or what Anteby et al. (2016) calls "doing jurisdictions." Indeed,
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11 the phenomenon described in such contributions often *is* boundary work as defined here, even if
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13 that label is not explicitly used. For that reason, we have included selected articles from this
14
15 adjacent literature stream in our analysis where appropriate (see Appendix 1).
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20 Finally, another relevant theoretical perspective for studying competitive boundary
21
22 relations is Bourdieu's (1977, 1984) theory of practice. His notion of "fields of practices" refers in
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24 particular to bounded and socially constructed social, historical and material contexts where certain
25
26 types of practices are favored and where status distinctions emerge as a function of individuals'
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28 access to economic, cultural, social and symbolic forms of capital specific to a given field. We
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30 now explore the insights emerging overall from the "competitive boundary work" literature.
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33 **Modes of competitive boundary work**

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36 We identified three broad categories of studies focusing on competitive boundary work,
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38 depending on the particular situations and agent positions considered: *defending*, *contesting*, and
39
40 *creating boundaries* (for detailed coded examples, see Appendix 1 in the supplementary
41
42 materials). We elaborate on each of these categories in turn.
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44 ***Defending boundaries***

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47 We include in this category studies focusing on the boundary work of established groups
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49 defending, and sometimes also extending, their domains. In these studies, the work examined
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51 mainly unfolds around one boundary which is made visible through a dichotomy, for example
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53 between scientists and non-scientists (Garud et al., 2014; Gieryn, 1983, 1996) or between a
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3 privileged occupational group and others in its environment (Burri, 2008; Hazgui & Gendron,
4 2015; Martin, Currie, & Finn, 2009). Boundary work of this type is ongoing, but often made
5 particularly salient by some trigger or external threat (e.g., a government policy, a crisis, a new
6 technology, see Appendix 1). Thus, most studies deal with how to protect or restore something
7 that has been challenged. However, these studies pay little attention to the boundary work of the
8 challengers (addressed in the second category below).
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17 Many of the studies focus, like Gieryn (1983), on the *discursive* means by which boundaries
18 are defended or repaired. Drawing on documentary evidence and interview data from members of
19 the target group, they examine the language through which proponents legitimize their position.
20 For example, Garud et al. (2014) analyse Climategate, an incident where a computer server was
21 hacked and climate scientists' data and private emails were spread on the internet shortly before
22 the United Nation's Climate Change Conference in Copenhagen. The breaching of the boundaries
23 of climate science through the diffusion of these materials gave fuel to heated discussions on the
24 trustworthiness of climate science, since these informal communications diverged from the aura
25 of objectivity and rigor claimed by scientists. It took several formal investigations by reputable
26 scholars to re-establish the "scientific" legitimacy of the research and the practices used to produce
27 it, something that Garud et al. (2014) call "*boundary repair work*." Garud et al. (2014) also argue
28 that rather than retreating behind their boundaries, scientists need to engage in *boundary bridging*
29 *work* to connect with the public using narrative rather than scientific language, a stance that
30 suggests the limits of hard line defensive boundary work (a theme that returns later in this section).
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49 Another interesting set of studies using discursive methods draws on the notion of "ethical
50 boundary work" (Hobson-West, 2012; Wainwright, Williams, Michael, Farsides, & Cribb, 2006).
51 From this perspective groups respond to ethical challenges associated with their work practices by
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3 constructing “an ethical space” that enables them to maintain their credibility and position. For
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5 instance, participants in these studies constructed distinctions between different forms of life such
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7 as human vs. animal (Hobson-West, 2012) or unfertilized vs. fertilized vs. impregnated embryos
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9 (Ehrich, Williams, & Farsides, 2008; Wainwright et al., 2006) to justify animal research, stem cell
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11 research, and practices associated with intravenous fertilization respectively. They then drew on
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13 formal legal and ethical frameworks to establish themselves as belonging to the “ethical” category,
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15 in contrast to others whose practices were constructed as more questionable (e.g., farmers in the
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17 case of Hobson-West’s [2012] study of animal scientists). These studies show how defensive
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19 boundary work may need to draw discursively on a variety of symbolic categories (in this case,
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21 ethical vs. non-ethical), and not just those originally associated with specific occupations.
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26 While the above studies focus on discursive strategies, other research has paid greater
27
28 attention to *practices* of defensive boundary work. The theme of “bridging” returns for example
29
30 in a different way, in Hazgui and Gendron’s (2015) study of how the French audit profession
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32 responded to new oversight regulations that threatened their independence. The accounting firms
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34 initially resisted new role boundaries by withholding information, downplaying the need for
35
36 change and casting doubt on others’ competence. However, over time, they found a way to stabilize
37
38 role boundaries by providing resources to the oversight body and by developing a hybrid regulatory
39
40 pattern (co-regulation). Essentially, the accountants conserved their dominance through a kind of
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42 cooptation and interpenetration with the body that regulated their practices, achieved paradoxically
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44 by bridging and “blurring” their boundaries with the regulator.
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49 The reproduction of dominance despite attempts to modulate it is in fact a common theme
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51 in the boundary work and related literatures, evident for example in many accounts of attempts to
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53 involve lower status professionals in health care delivery (Allen, 2000; Martin et al., 2009). For
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3 example, Allen (2000) described the defensive practices of nurse managers faced with policy
4 changes involving the introduction of assistants and support staff. She showed how these managers
5 engaged in boundary work by demarcating nursing work from other types of work. This was done
6 by taking charge of the implementation of new role requirements, establishing expertise and by
7 valuing the nurses' holistic expertise and superiority vs. assistants.
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14 A final example of a study of defensive boundary work illustrates not only the role of
15 discourse and practices, but also the role of materiality in supporting the reach of a professional
16 group and allowing it to maintain its position. Burri's (2008) ethnographic study of the
17 transformation of health care imaging focuses on the emergence of technologies such as MRI, CT,
18 and PET scanning, and on how (despite a narrow base of original expertise grounded in X-rays)
19 radiologists engaged in boundary work to claim jurisdiction over the technology and practices
20 related to its handling. They did this by ensuring that the new machines were installed physically
21 within radiology departments and not elsewhere (the material dimension), by claiming unique
22 expertise in the production and interpretation of images, and by rapidly developing the ability to
23 publish results from their research. Essentially, they pre-emptively populated this adjacent domain
24 in order to sustain their position in the medical hierarchy.
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40 In sum, studies focusing on defensive boundary work emphasize the efforts of agents
41 situated on one side of a boundary, and show how they discursively construct themselves as distinct
42 and superior on critical dimensions, e.g., scientific or not (Garud et al., 2014; Gieryn, 1983); ethical
43 or not (Hobson-West, 2012; Wainwright et al., 2006); competent or not (Allen, 2000; Burri, 2008;
44 Hazgui & Gendron, 2015), while at the same time mobilizing practices that instantiate and enhance
45 their claims, e.g., by taking control (Allen, 2000; Burri, 2008), by bridging and coopting others
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3 (Garud et al., 2014; Hazgui & Gendron, 2015; Murray, 2010) and by following normative rules
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5 and regulations (Hobson-West, 2012; Wainwright et al., 2006).
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7 8 ***Contesting boundaries*** 9

10 While the studies described above sometimes hint at the struggles lying behind such
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12 boundary work tactics, they do not focus in depth on other parties in these struggles. The present
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14 category opens up that black box. Indeed, one of the distinctive contributions of this second
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16 category of studies is that they show how and why the boundary work tactics of competing groups
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18 may differ depending on their status (Bach et al., 2012; Bucher et al., 2016; Sanders & Harrison,
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20 2008), or centrality with respect to a contested issue (Bucher et al., 2016; Lefsrud & Meyer, 2012),
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22 or on their positioning as “incumbents” (i.e., established groups) or as “challengers” (Ezzamel &
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24 Burns, 2005; Helfen, 2015; Huising, 2014; Suddaby & Greenwood, 2005).
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28 Bach et al. (2012), Bucher et al. (2016) and Sanders and Harrison (2008) all compare the
29
30 discursive boundary work of different hierarchically stratified professional groups in the health
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32 care field as they are faced with pressures to work more closely together. Studying nurses and
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34 health care assistants in two hospitals, Bach et al. (2012) showed how nurses underscored the
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36 *differences* between the two groups, assigning healthcare assistants a subordinate role as “helpers”
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38 who did not possess the “holistic” judgement to provide best quality of care that could be done
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40 only by nurses (reaffirming boundaries). In contrast, the healthcare assistants called on the notion
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42 of “teamwork” and emphasized *similarities* between the two roles (blurring boundaries). Similar
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44 observations are also present in Allen’s (2000) study discussed earlier, and are hinted at in Bucher
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46 et al.’s (2016) study as well.
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51 The studies by Sanders and Harrison (2008) (on four professional groups working in a unit
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53 for heart failure patients), and Bucher et al. (2016) (on the reaction of five professional associations
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3 to proposals for inter-professional collaboration) show however that it is not always the highest
4 status groups that tend to emphasize most strongly technical superiority in their discourse. Rather,
5 the discursive boundary work of these groups (doctors, in these cases) tends to normalize their
6 position as natural leaders, without showing the need to justify this position explicitly or with
7 rational arguments. In other words, their superiority seems assumed or taken for granted in their
8 discourse. In contrast, middle and lower status groups, seen as challengers, were much more
9 inclined to make explicit and detailed arguments about their competence and qualifications.
10 Although they do not explicitly refer to “boundary work” per se, Suddaby and Greenwood’s (2005)
11 findings about the rhetorical strategies of incumbent law firms facing challenger accounting firms
12 engaging in multi-disciplinary practices are similar. Overall, there seems to be a clear tendency for
13 dominant groups to assume the natural rectitude of current boundaries, and to begin at least by
14 relying on their power and position to shrug off the claims of others.
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31 Bechky (2003) further shows how boundaries might be contested not only discursively but
32 also through artifacts. In a study of a semi-conductor manufacturing firm, she shows how mastery
33 of engineering drawings as recognized symbols of knowledge, authority and legitimacy, enabled
34 engineers to preserve favorable occupational boundaries with two “lesser” occupational groups
35 (technicians and assemblers), while technicians’ and assemblers’ control over other artifacts
36 (machines produced in part from the drawings) provided them with some leverage to challenge the
37 engineers’ dominance, though not always successfully.
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47 The question arises, however, as to how boundary contestation may play out over longer
48 periods of time as practices of dominant groups are challenged. Among studies in this category,
49 three examples offer insight into this question. Ezzamel and Burns (2005) examined the
50 introduction of the concept of “economic value added” (EVA) in a large retail company. This
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3 triggered competition between the purveyors of EVA from the finance department and buyers and
4 merchandisers (B&M) in another department, clearly the more powerful group. By blaming
5 finance for a lack of understanding and largely ignoring or undermining their work, the B&M
6 group were “successful” in protecting their domain, and EVA was abandoned. However, B&M
7 managers nevertheless internalized some ideas from finance, making their boundaries less distinct,
8 a finding that recalls Hazgui and Gendron’s (2015) study of auditors discussed earlier.
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11 While these studies illustrate the failure of challengers, other studies unveil how the politics
12 of boundary work over time can allow power reversals. For example, Helfen’s (2015) long-term
13 study of the legalization contest for employment agency work in Germany provides an example of
14 how field settlements between incumbents and challengers may change over time. Incumbents,
15 dominating the field are shown to be activating, upholding and reinforcing boundaries to maintain
16 the field’s order (i.e., engaging in what might be called “boundary maintenance work”), while
17 challengers strove to redraw and symbolically weaken boundaries (discursively and through
18 images) to change the field from within. Challengers also built ties to actors in other fields, thus
19 connecting to outside developments and forming successful coalitions for change. Although not
20 explicitly mobilizing the notion of boundary work, Huising’s (2014) study of how managers
21 attempted to implement greater control over researchers’ safety procedures describes very similar
22 practices. More specifically, new managers and lab coordinators were able to overcome the passive
23 resistance of specialists who previously held sway by creating a coalition with the researchers,
24 eventually reducing their powerful role, and enhancing the role of the coordinators.
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27 A final theme relevant to boundary contestation concerns the potential for intersectionality,
28 in which different types of boundaries become intertwined. We see hints of this in Bach et al.’s
29 (2012) study of health care assistants where gender-related concerns for care served to add value
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3 to their role as compared with nurses who distanced themselves from such tasks in their quest for
4 status. More explicitly, Johansson and Lundgren (2015) show how boundary work at a
5 supermarket was performed through the intersection of physical, social and mental (or symbolic)
6 boundaries. Physical boundary work had to do with the gendered division of workers both
7 organizationally and architecturally to a specific workspace. Mental and social boundary work
8 reinforced gender distinctions, even though gender was never used as an explicit reference in
9 decision making. Similarly, Persson's (2010) study in the Swedish armed forces notes the
10 difficulty of disentangling core (combat) and support (civilian) distinctions from gender
11 distinctions even when these no longer converged, with negative effects on the status accorded to
12 women even when they held similar positions to men. Finally, Arndt & Bigelow (2005) show how
13 the association between gender and occupational boundaries may emerge over time. The authors
14 draw on archival data to trace the emergence of a new profession – the hospital administrator –
15 showing how boundary work paved the way for the masculinization of a previously female
16 occupation. In the early 1900s, most hospital superintendents were female nurses. However, as a
17 business logic penetrated the health care field, men came to be seen as appropriate heads of
18 hospitals.

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40 In sum, the studies in this category reveal some of the friction generated by the boundary
41 work of different interacting groups. While higher status or incumbent groups tend to rhetorically
42 construct their differences and superiority as natural and unquestionable, other groups try to blur
43 boundaries, and go to greater lengths to explicitly justify and promote their positions. The studies
44 presented above suggest, however, that the ability of challengers or lower status groups to
45 significantly influence the boundaries they share with others may depend less on rational
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3 argument, and more on their ability to build relationships and compromise (Ezzamel & Burns,
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5 2005) or to construct coalitions with others to achieve change (Helfen, 2015; Huising, 2014).
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8 *Creating boundaries*

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10 The final category of competitive boundary work deals with newer or weaker groups
11 creating boundaries and spaces for themselves. For example, newly popular management concepts
12 may trigger boundary work as emerging occupational groups associated with these trends move to
13 legitimize new roles (Edlinger, 2015; Mikes, 2011; Reay, Golden-Biddle, & Germann, 2006).
14
15 Also, new or alternative organizations may struggle to establish their positions, either in terms of
16 who is or is not included (Ashuri & Bar-Ilan, 2016) or in terms of how they relate to others in their
17 environment (Farias, 2017; Greenman, 2012; Santos & Eisenhardt, 2005).
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20 Edlinger's (2015) study of employer brand managers and Mikes (2011) study of risk
21 managers in banks both consider the boundary work of new occupational groups establishing
22 positions for themselves within organizations. In some cases, the practices identified seem quite
23 similar to those associated with defensive boundary work. For example, Edlinger's (2015)
24 employer brand managers are seen to engage in practices of creating, controlling, promoting,
25 protecting, and policing the "ideal employer brand" – essentially, communicating that only *their*
26 representations of the employer brand have legitimacy, although they are clearly struggling to
27 make this stick with other internal groups. Similarly, some risk managers (but not others) attempt
28 to create an independent and distinct expert function focusing on 'control via measurement'
29 (Mikes, 2011), thus *expanding and demarcating* the territory of mathematical risk control, while
30 protecting the risk function's autonomy. However, the author also shows how risk managers in
31 another group of banks, adopted an alternative style of risk control based upon human judgment
32 and soft instrumentation to anticipate risk, *expanding the boundaries* of the risk universe beyond
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3 formal modeling by *creating forums* for planning and strategic decision making. Interestingly,
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5 Mikes (2011) suggests that the hard boundary-drawing of the first group of risk managers may
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7 protect their expertise, but limit strategic influence. In contrast maintaining more porous
8
9 boundaries seemed to increase the potential for influence on strategic decision making.
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12 The two alternative boundary creating strategies identified by Mikes (2011) illustrate
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14 tradeoffs newer or weaker groups may need to make between what we might call “purifying” and
15
16 “bridging” (see earlier discussion). Indeed, while the employer brand managers in her study
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18 seemed mainly focused on “purity,” Edlinger (2015) also notes how they rely greatly on the
19
20 support of top management to pursue their work, suggesting that “bridging” (at least to more
21
22 powerful groups) was important too. Similarly, the nurse practitioners in Reay et al.’s (2006) study
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24 developed their legitimacy by fitting their roles into a complex system, while working to
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26 demonstrate their value, emphasizing bridging and incremental acceptance rather than hard and
27
28 fast boundary demarcation, enabling them to position themselves in the health care terrain.
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33 The work of creating boundaries has also been studied at the organizational level. For
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35 example, Santos and Eisenhardt (2005) show how entrepreneurs may use “soft-power” boundary
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37 work strategies to dominate new markets. They found that technological entrepreneurs relied on
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39 three processes: claiming, demarcating and controlling the market. Claiming the market included
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41 discursive identity-based moves aimed at equating themselves with a new market category.
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43 Demarcating included building alliances and coopting powerful players. Controlling the market
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45 included acquisitions that eliminated competitors and blocked the entry of others. Entrepreneurs
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47 who engaged aggressively and persistently in these three boundary moves were more successful
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49 in capturing a new market category, and establishing themselves as leaders than those who did not
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54 (Santos & Eisenhardt, 2005).
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3 Other studies reveal how social and cultural preoccupations may intervene more strongly
4 in organizational boundary work. Greenman (2011) shows how entrepreneurs in the cultural sector
5 drew on their artistic occupational identity to delimit what their ventures would engage in,
6 imprinting a particular style on their firms, something that is close to Santos and Eisenhardt's
7 (2005) notion of "claiming," and that was used to display legitimacy and build commitment to the
8 venture. Yet, such commitments could also limit the wider market penetration of these ventures.
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12 The roles of social or non-commercial commitments in boundary work is even more evident
13 in two other studies. In a study of a housing cooperative, Ashuri and Bar-Ilan (2016) show how
14 "flat organizations" can work to filter potential participants by using internet-based platforms that
15 can validate the identity, social awareness and commitment of potential recruits. Farias' (2017)
16 study deals with a non-capitalist community where members are struggling with being embedded
17 in a capitalist system while at the same time resisting it. The study focuses on boundary work
18 associated with money, which members disdain but at the same time need to survive. Farias
19 identifies the unstable and porous dynamics of boundary work in which members engage in
20 "distancing" and "re-appropriating" practices. "Distancing" includes allowing only a few members
21 to handle money and do so outside the commune, while "re-appropriating" implies shifting the
22 meaning of money as "good" or "bad" depending on how it is used (e.g., for the community or for
23 individual benefit). These studies show the delicate boundary work that marginalized groups need
24 to engage in to sustain their difference in the context of a dominant culture and practices.
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47 In sum, we see here two overarching patterns in creative boundary work. On the one hand,
48 groups aim to position themselves as valuable in a wider domain, seeking legitimacy with
49 dominant actors or organizations. Their work to establish distinctiveness is thus almost always
50 tempered and/or combined with strategies of bridging or connection with powerful others to help
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3 build their influence (Edlinger, 2015; Mikes, 2011; Santos & Eisenhardt, 2005). On the other hand,
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5 there are other groups and organizations whose social mission involves some degree of opposition
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7 to dominant strands of society (Ashuri & Bar-Ilan, 2016; Farias, 2017). This involves trying to
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9 minimize or attenuate connections rather than embracing them.
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11 **Competitive boundary work: Assessment and limitations**

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15 Based on our review of the competitive boundary work literature, we see that the concept
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17 has developed well beyond Gieryn's (1983) initial work that focused mainly on discursive and
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19 defensive demarcations, to include research on everyday practices and includes activities of
20
21 contesting and creating boundaries. Such boundary work includes not only established
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23 agents/groups, but also new agents and those in weaker positions, who characteristically place
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25 more emphasis on boundary blurring to signal their proximity to rather than distance from
26
27 privileged others, unless their identity is explicitly tied to opposing the mainstream.
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31 Indeed, somewhat surprisingly we found that competitive boundary work often involves
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33 blurring and bridging in combination with demarcation. This contrasts with Gieryn's (1983) and
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35 Abbott's (1988) original work which conceived boundaries as mechanisms that clarify differences
36
37 and establish divisions. From this original perspective, successful boundary work results in the
38
39 creation of impermeable boundaries. However, several studies point to the importance of
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41 connection across boundaries. For example, Garud et al. (2014) suggested that boundary bridging
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43 was needed to restore the credibility of climate science, while Mikes' (2011) show how risk
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45 managers benefited from leaving porous boundaries between the risk function and strategic
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47 managers. The paradoxical tensions and tradeoffs between isolation and connection seem deeply
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49 embedded in the streams of work discussed here. While all the groups, occupations and
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3 organizations studied seem oriented towards developing and conserving their power and
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5 legitimacy, they may draw to varying degrees on alliances and connections to achieve this.
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8 We now raise some more critical concerns and emergent opportunities of this stream of
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10 work under two headings, one dealing with central tendencies (the nature and dynamics of
11
12 competitive boundary work) and the other with variations (contingencies and consequences).
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15 ***Emergent opportunities: The nature and dynamics of competitive boundary work***
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18 A first insight that deserves further development is the idea that since all boundaries exist in
19
20 relation to others, defending and maintaining one boundary may also involve or affect other
21
22 boundaries. Accordingly a fruitful direction for further research is the study of the intersectionality
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24 of different kinds of boundaries and the ripple effects among them (Arndt & Bigelow, 2005;
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26 Hobson-West, 2012; Persson, 2010; Wainwright et al., 2006).
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29 Another direction for future work involves the consideration of competitive boundary work
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31 strategies over longer periods of time, given that most extant studies focus on positioning at
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33 particular moments. The few studies that have attempted this demonstrate how a longitudinal
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35 orientation may produce interesting and novel findings. Helfen's (2015) study of boundary work
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37 in the German employment agency industry over 55 years is a good example. The long time frame
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39 enables the co-evolution in boundary work strategies of opposing groups to be observed, and to
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41 detect shifting strategies and power relations, something that may not be visible in shorter term
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43 studies, where it often seems that boundary work largely reproduces the status quo (see also Hazgui
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45 & Gendron, 2015; Murray, 2010 for other longitudinal examples).
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50 Most of the studies of competitive boundary work also tend to focus on moments when
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52 boundaries are made particularly salient by specific triggers such as new technologies, regulatory
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54 changes, direct challenges from other groups, or expansive aspirations. This may sometimes give
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3 the impression that competitive boundary work is mainly episodic. However, this may turn out to
4 be an optical effect because relatively few of the studies discussed in this section examine routine
5 boundary work in the absence of major triggers, Bechky's (2003) study of how engineers preserved
6 their boundaries in everyday interactions being a notable exception. More studies will need to
7 explore the ongoing competitive boundary work of incumbent groups and the nature and processes
8 through which background concerns with boundary maintenance in the face of potential challenges
9 are sustained and dealt with.
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19 Finally, this body of work has given relatively limited attention to the role of materiality,
20 with the exception of Burri's (2008) analysis of how radiologists used physical space to consolidate
21 their jurisdiction over other imaging technologies, and Bechky's (2003) study of artifacts as
22 "representations of occupational jurisdiction." This is another area where further research would
23 be warranted. It seems likely that material and technological artifacts as well as physical spaces
24 (or what Garud et al. (2014) has called the "boundary infrastructure") might serve as allies or
25 hindrances in competitive boundary work in other settings, and that changing technologies might
26 serve to shift these competitive dynamics. We begin to see more evidence of this in some of the
27 studies reviewed under the heading of "collaborative boundary work."
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40 ***Emergent opportunities: Contingencies and variations in competitive boundary work***

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42 To date, studies on competitive boundary work have mainly focused on *describing*
43 discursive strategies and practices of boundary work, developing a rich set of typologies of how
44 this is done without explicitly addressing whether all practices are equally effective in establishing
45 and sustaining positions of power, legitimacy and privilege. Indeed, given the processual nature of
46 this research there has been relatively little overt emphasis or interest in studying the implications
47 of variance. Nevertheless, interesting insights on this issue may be derived from existing literature
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3 in two ways: (a) by focusing on who tends to “win” and how they do so in studies of boundary
4 contestation; (b) by paying particular attention to the few studies where comparative designs have
5 been used.
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10 In terms of the first, some intriguing patterns emerge from the accumulation of a variety of
11 different case studies. For example, the boundary work strategies of high status groups tend to
12 differ from those of lower status groups in terms of emphasis on naturalizing clear boundaries vs.
13 attempting to blur them (Bach et al., 2012; Bucher et al., 2016; Sanders & Harrison, 2008).
14 Boundary work also tends to favor incumbents and boundary relations generally tend to be
15 reproduced over time in favor of dominant groups (Allen, 2000; Bucher et al., 2016; Sanders &
16 Harrison, 2008). Yet, lower status or challenger groups may be able to “win” or at least overcome
17 their disadvantages through boundary work strategies that involve establishing alliances and
18 coalitions (Helfen, 2015; Huising, 2014). However, the design of most of these studies does not
19 enable us to compare the effectiveness of these strategies with other possibilities. Only two of the
20 studies mentioned in our review adopted such a comparative design (Mikes, 2011; Santos &
21 Eisenhardt, 2005), both however, confirming the superiority of boundary work strategies based on
22 alliances over those based on isolation in establishing an influential position.
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40 Another variance-type question is whether competitive boundary work between groups
41 might play out differently in hierarchical settings where formal authority plays a role, as compared
42 with more loosely structured settings. For example, an organization’s top managers might act to
43 legitimate the boundary claims of certain groups over others (e.g., as in the case of Edlinger’s
44 (2015) employer brand managers or Huising’s (2014) lab coordinators), and regulatory authorities
45 may intervene to impose boundary relations (e.g., as in Helfen’s (2015) study of agency work).
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54 Yet, the political dynamics by which formal authority is brought to bear on such boundary disputes
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3 is not as simple as resolution by fiat, even in these cases. This suggests that research on competitive
4 boundary work might more systematically theorize about the roles of powerful third parties who
5 are not directly implicated in boundary settlements but who can influence them significantly.
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10 Overall, this suggests that there is room not only to consider boundary work practices over
11 longer periods of time, but also to develop more systematic comparative designs to assess the
12 relative effectiveness of boundary work strategies in enhancing the positions of different groups.
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18 **Collaborative Boundary Work: Working *at* Boundaries**

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20 The second main category of studies labeled “collaborative boundary work” focuses on
21 practices through which groups, occupations and organizations work *at* boundaries to develop and
22 sustain patterns of collaboration and coordination in settings where groups cannot achieve
23 collective goals alone. The practices of collaborative boundary work emerge as people work in
24 inter-occupational teams, produce services, and construct inter-organizational collaboration.
25 Whereas, in the previous section, we saw different groups interacting in an oppositional way, here
26 we see how boundaries are negotiated, aligned, accommodated and downplayed in order to get
27 work done (Apeosa-Varano, 2013; Barrett et al., 2012; Bechky, 2006; Quick & Feldman, 2014).
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39 **Historical roots and adjacent literatures**

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41 As we indicated, the competitive boundary work literature is deeply connected to Gieryn’s
42 (1983) original concept and indeed, some authors appear to restrict the notion of “boundary work”
43 to its more “competitive” form. However, others consider the term in a much broader sense that
44 draws out its relevance to collaboration (Faraj & Yan, 2009; Lindberg et al., 2017; Meier, 2015;
45 Quick & Feldman, 2014; Soundararajan, Khan, & Tarba, 2018; Yagi & Kleinberg, 2011; Ybema,
46 Vroemisse, & van Marrewijk, 2012). Indeed, a focus on collaborative boundary work reminds us
47 that although boundaries may raise tensions, they are also often necessary to accomplish
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3 collaborative work. Working together frequently means developing mutual understandings about
4 who will do what. Quick and Feldman (2014), in particular, pointed out that while boundaries are
5 often considered to be “barriers”, they can also be seen as “junctures” that may be drawn on to
6 enable rather than inhibit collaboration. At the same time, collaborative work *at* boundaries may
7 also require accommodation in the moment to overcome problematic boundary rigidities.
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14 The theoretical stream that has most inspired studies of collaborative boundary work is the
15 negotiated order perspective which emphasizes that social order is performed through ongoing
16 negotiations between the particular people involved in everyday interactions (Strauss, 1978;
17 Strauss, Schatzman, Ehrlich, Bucher, & Sabshin, 1963). For Strauss (1978, p. 11), negotiation is a
18 way of “getting things accomplished” or “making them continue to work;” it is through this
19 negotiation work that social order, including *de facto* divisions of labor (in the form of more or
20 less porous boundaries) emerges. Thus negotiation in this literature does not always imply explicit
21 one-off bargaining and involves instead emergent everyday give and take, oriented by the broader
22 structural context of formal rules, technologies, roles and resources, but never completely
23 determined by them (Allen, 1997).
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37 There are also some adjacent literatures that do not refer explicitly to “boundary work”
38 using this specific term, but that take an interest in understanding the practices through which
39 groups address boundaries to accomplish collaborative tasks. The boundary spanning literature,
40 for example, focuses on the way in which people work across existing boundaries. However, the
41 vast majority of this literature takes a functionalist rather than a practice perspective on boundaries,
42 and assumes boundaries to be fixed in advance rather than socially constructed through practice.
43 It generally takes boundary-spanning to be a black-boxed “variable” or “role” that is examined as
44 varying in intensity and form (e.g., internal vs. external) depending on specific antecedents, and
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3 that may also be a predictor of outcomes (Aldrich & Herker, 1977; Marrone, 2010; Rosenkopf &
4 Nerkar, 2001; Tushman, 1977). Because this broader literature generally does not focus on the
5 actual “work” of boundary negotiation, we have not included it in this review. That said, there are
6 a limited number of important contributions in the boundary spanning literature that do take a
7 practice perspective and view boundaries as reconstructed through the very practices by which
8 collaboration is negotiated (e.g., Kaplan, Milde, & Cowan, 2017; Levina & Vaast, 2005). Since
9 we consider these to be valuable for understanding boundary work, we have included a selected
10 group of these articles in this review (see Appendix 2 in the supplementary materials).
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22 Similarly, another concept that has relevance to collaborative boundary work is the notion
23 of “boundary object.” The concept was originally introduced by Star and Griesemer (1989) to
24 describe an object or artifact that bridges different knowledge communities, enabling them to
25 communicate meaning across boundaries even when they do not share common expertise. Carlile
26 (2002, 2004) further developed the notion that different kinds of boundary objects or
27 “representations” of knowledge might be required to traverse different types of knowledge
28 boundaries. Selected contributions to this literature that are relevant to collaborative boundary
29 work because they draw explicitly on a practice perspective and view boundaries, not as fixed, but
30 as socially constructed through interaction, are therefore also included in this review (see Appendix
31 2 in the supplementary materials for a coded analysis of the articles discussed here).
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44 **Modes of collaborative boundary work**

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47 Three subcategories of collaborative boundary work were identified in this review (see
48 examples in Appendix 2) that we label *negotiating, embodying and downplaying boundaries*. We
49 elaborate on each of these categories in turn.
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Negotiating boundaries

Among the studies on collaborative boundary work, by far the largest group falls within this subcategory, in which studies conceptualize collaboration as made possible by processes of boundary negotiation. These studies thus often draw directly on negotiated-order theory or other frameworks (e.g., actor-network theory or the notion of “trading zones”) (Galison, 1999; Latour, 2005) that imply give and take as boundaries emerge and are reformed in and through interaction, sometimes in the course of everyday work (Allen, 1997; Apesoa-Varano, 2013; Bechky, 2006; Kellogg, Orlikowski, & Yates, 2006; Liberati, 2017), and sometimes in reaction to specific triggers such as new technology or new work practices (Barrett et al., 2012; Håland, 2012; Lindberg et al., 2017; Rodriquez, 2015; Sage, Justesen, Dainty, Tryggestad, & Mouritsen, 2016).

As mentioned, these studies emphasize the productive role of socially constructed boundaries and boundary work in pragmatically agreeing on the work that needs to be done. At the same time, studies of everyday work reveal, for example, how formally understood roles and jurisdictional boundaries may be blurred or reinterpreted as they are enacted in practice in situations where collaborators are dependent on each other to accomplish their tasks. For example, in their studies of occupational groups in health care, Allen (1997), Apesoa-Verano (2013) and Liberati (2017) show how some professionals (nurses or health care assistants) step in and do the work of others (doctors or nurses respectively) when needed to ensure adequate patient care, resulting in little overt conflict or strain – and indeed, a process of ongoing boundary-blurring and accommodation (Allen, 1997). Liberati (2017) further found that the extent of boundary blurring varied depending on features of the context (patient acuity, awareness and clinical approach), with some settings showing clearer separation of roles, and others involving highly fluid blurring.

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3 Such studies of everyday collaborative boundary work negotiated in the moment are
4 particularly rich and revealing because they show exactly how boundary work is accomplished in
5 specific interactions and practices in the workplace, e.g. through activities or conversations among
6 occupational groups (Allen, 1997; Apesoa-Varano, 2013; Liberati, 2017; Rodriguez, 2015).
7 Similarly Bechky's (2006) study of film crews shows how repeated practices of friendly thanking,
8 admonishing and joking serve to signal and enact role boundaries on the film set, ensuring that
9 people understand what to do when and how. This form of emergent collaborative boundary work
10 is grounded in and reproduces general understandings of the role structure for film-making that
11 are reenacted in other projects, though never in identical ways.
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24 Kellogg et al.'s (2006) study of boundary relations among four groups in a fast-moving
25 internet advertising agency offers a somewhat different perspective on negotiated boundary work,
26 manifested in what the authors call a "trading zone" (Galison, (1999). Here, groups collaborate
27 through the public display of their work, its representation (notably in PowerPoint) and through
28 the progressive assembly or juxtaposition and redesign of their diverse contributions into a collage
29 that eventually becomes the product delivered to customers. Here the dynamic role of emerging
30 artifacts in the collaboration recalls but enriches the relatively static notion of "boundary object,"
31 since the mediating object itself is created and transformed as people intervene on it.
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42 While the studies described above all illustrate how boundaries are negotiated to enable
43 collaboration (rather than to promote power positions *per se*), it is nevertheless important to
44 understand that power relations inevitably underpin the way in which ongoing negotiations play
45 out (Strauss, 1978). For example, the flexible and non-conflictual boundary accommodations at
46 the margins described in the health care studies by Allen (1997), Apesoa-Verano and Verano
47 (2014) and Liberati (2017), occur under the radar, and are never formally legitimized. Given this,
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3 Apesoa-Verano and Verano (2014) point out that they may ironically tend to reproduce rather than
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5 undermine status hierarchies, despite their crucial importance in enabling collaboration and
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7 efficient work practices. In addition, Kellogg et al. (2006) note that issues of identity, control, and
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9 accessibility sometimes hamper collaboration despite the generally effective boundary trading
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11 practices they describe. Indeed, just as competitive boundary work sometimes occurs through
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13 alliances and collaboration, collaborative boundary work is often underpinned by threads of
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15 tension and competition. This critical irony tends to be an underlying theme in much of the
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17 “negotiating boundaries” subcategory (see also Barrett et al., 2012; Håland, 2012).
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22 A number of other studies focus not on ongoing everyday practices, but on how the
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24 introduction of a technological innovation triggers a reconfiguration of the relationships among
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26 collaborating groups or domains of knowledge. This is the case of the pharmacy robot studied by
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28 Barrett et al. (2012), the Electronic Patient Record studied by Håland (2012) and the hybrid
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30 operating room studied by Lindberg et al. (2017). These studies highlight in particular the role of
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32 materiality in reorienting boundary negotiations. For example, the robot studied by Barrett et al.
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34 (2012) required new forms of collaborative work among pharmacists, technicians and assistants
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36 and led to a reconfiguration of boundary relations among them, a process that the authors
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38 associated with “tuning” (Pickering, 2010) where the materiality of technology is entwined with
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40 human agency in reorienting practices. Specifically, depending on the degree to which the robot
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42 maintained, upgraded or took over the skills of occupational groups, the relations among them
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44 developed different patterns of boundary work varying from cooperation (pharmacists and
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46 technologists), through neglect (pharmacists and assistants) to strain (technologists and assistants).
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52 Lindberg et al. (2017) similarly show how the material features of a surgical robot became
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54 entwined with ongoing boundary work among surgical and radiology team members as they
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3 attempted to construct new modes of collaborative practice. Drawing on an actor-network theory
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5 lens, the authors show how emerging boundary relations were made visible, negotiated and
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7 stabilized through inscriptions of the joint hybrid practice in “methods cards.” Indeed, this study
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9 reveals tellingly the importance of establishing boundaries (and in this case, of embedding them
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11 in material artifacts) in order to make collaboration and coordination possible.
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15 The particular importance of establishing boundaries to enable collaboration is also revealed
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17 in Patriotta and Spedale’s (2011) contrasting study of decision making around an ostensibly
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19 collaborative consulting project. The study shows what can happen when a minimal consensus on
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21 boundary relations fails to be negotiated or enacted at the outset. The authors argue that the team
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23 leader’s apparently inept boundary work (undermined by others) sustained ambiguous roles, and
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25 an interaction order imbued with conflict, which was only resolved when team members began
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27 working in separate silos. This study also suggests that certain key actors may play an important
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29 role in collaborative boundary work, as developed further in the next subcategory.
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33 In sum, the literature discussed above suggests that boundary negotiations among different
34
35 groups both in the everyday and at more critical junctures are a common feature of collaborative
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37 boundary work. Inherent to this collection of studies is the somewhat paradoxical understanding
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39 of boundaries as both necessary to make collaboration possible, but at the same time subject to
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41 ongoing give and take in the moment to smooth over the cracks.
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44 ***Embodying boundaries***

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46 The second group of studies highlights a different way of performing collaborative
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48 boundary work, namely by focusing on people occupying specific positions and incarnating
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50 boundaries within their very activities. We have called this mode of collaborative boundary work
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52 “embodying boundaries” as these studies explore how people practice collaborative boundary
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3 work through their being and doing both within (Azambuja & Islam, 2019; Yagi & Kleinberg,
4 2011) and between (Ellis & Ybema, 2010; Soundararajan et al., 2018) organizations. Beyond
5 literature using the term “boundary work” per se, a few studies that focus on “boundary-spanners-
6 in-practice,” also seem relevant here (Kaplan et al., 2017; Levina & Vaast, 2005).
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12 Exemplary of this category, Azambuja and Islam’s (2019, p. 5) ethnographic study of an
13 auditing firm shows how middle managers cope with the ambivalence of everyday boundary work
14 (defined here as “working between actors”). Middle managers at times experience emancipation,
15 when they feel empowered by the different roles and expectations, autonomously pushing back
16 boundaries. At other times, they experience alienation, as they feel the fatigue and isolation of
17 satisfying different demands. The authors conclude that in managing ambivalence, middle
18 managers regularly shift between being agential and reflexive “boundary subjects” who can on
19 their boundary positions, and being “boundary objects,” used by others as “interfacing and
20 cooperation devices” (Azambuja & Islam, 2019, p. 2).
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33 In a similar way, despite the different context, Yagi and Kleinberg’s (2011, p. 630)
34 ethnographic study of a Japanese subsidiary in the US focuses on the “lived experience” of
35 organization members working at the intersection of intra-organizational, cultural and national
36 boundaries. The authors reveal how Japanese employees in the US perform the role of “pipes,”
37 functioning as conduits between Japan and the US, implying at the same time different
38 organizational units, cultures, nations, and languages. The paper shows how “pipes” do boundary
39 work by “absorbing” cultural differences within themselves, never explaining them to counterparts
40 but smoothing over their relations. Other “pipes” experience identity tensions because of
41 asymmetrical expectations from Japanese and US colleagues, causing them to shift boundary
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3 positions depending on the circumstances, building on “their knowledge of multiple cultures, and
4 their ability to flexibly utilize that knowledge” (Yagi & Kleinberg, 2011, p. 649)
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8 The notion of people embodying boundaries by acting as both “boundary subjects” and
9 “boundary objects,” is echoed in a different way in Kaplan et al.’s (2017) study of collaboration
10 at an interdisciplinary research center on nanotechnology. Though not explicitly using the term
11 “boundary work,” the authors draw attention to the role of material elements in the practices
12 adopted by students, who are conceptualized as “symbionts,” embodying boundaries between
13 disciplines through their mastery of costly instruments which disciplinary scientists are unable to
14 use, but that allow the students to invent new interdisciplinary projects and connect others, making
15 collaboration across political and cognitive boundaries possible.
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26 While the studies reviewed so far focus on intra-organizational boundaries, several other
27 studies focus on how people may embody boundaries between an organization and others, such as
28 consumers. For example, Boon (2007) studied how hotel room attendants normally operating
29 behind the scenes may find themselves on the front line when accidentally meeting guests in their
30 rooms during their cleaning work. The meeting transforms the room into a boundary region where
31 attendants come to embody the boundary between back-of-house and front-of-house, contributing
32 to the perceived quality of service. Ellis and Ybema’s (2010) study of alliance managers offers
33 another example of embodied collaborative boundary work at the frontiers of the organization.
34 The authors describe how managers whose role is to manage relations with other organizations
35 (who they label “boundary bricoleurs”) fluidly construct and reconstruct in their talk the
36 boundaries of the organization, the market, relationships and marketing management by using
37 different “interpretive repertoires” in different situations, sometimes constructing themselves as
38 belonging and at other times as not belonging to the organization and to the market.
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3 All these studies suggest that collaborative boundary work is often made possible through
4 the skillful activities of particular people managing the ambiguities of belonging to and navigating
5 different worlds. Based on studies of information technology collaborations, Levina and Vaast
6 (2005) observe that nomination to a formal “boundary spanner” role does not guarantee that an
7 individual will become what they call a “boundary-spanner-in-practice.” This requires establishing
8 oneself as a legitimate participant in multiple fields, a capacity to negotiate on behalf of members,
9 and a personal interest in constructing what the authors label, following Bourdieu (1977), a joint
10 field of practice. Soundararajan et al.’s (2018) study of the embodied boundary work of sourcing
11 agents in global supply chains further supports these observations.
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24 In sum, we see how collaborative boundary work may sometimes happen through the
25 agency of particular individuals who personally play the role of boundary subjects and/or boundary
26 objects, sometimes absorbing within themselves the boundary tensions that might otherwise inhibit
27 collaboration (Azambuja & Islam, 2019; Ellis & Ybema, 2010; Yagi & Kleinberg, 2011), and
28 sometimes actively mobilizing differences to establish their own distinctive roles in new fields of
29 collaboration (Kaplan et al., 2017; Levina & Vaast, 2005). The boundary work carried out by these
30 individuals involves both negotiating boundaries between groups, but also coping with their own
31 identity tensions. Embodying boundaries places people in a position of liminality where they
32 function as thresholds between different groups.
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44 ***Downplaying boundaries***

45 Although we noted above the potentially productive role of boundaries for collaboration,
46 much of the literature still tends to see them as obdurate and problematic in many instances. Studies
47 relating to the third mode of collaborative boundary work question that assumption, suggesting
48 that people can simply downplay boundaries when working together. Although this group of
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3 studies is smaller (possibly because suggesting that boundaries are unproblematic does not make
4 for interesting findings?), some research shows how existing boundaries might be purposefully
5 ignored or “assigned to the background, ‘out of sight’” (Meier, 2015, p. 63), and efforts may be
6 made to downplay the divide between “us” and “them” to achieve a “we”. This might happen in
7 both intra-organizational (Majchrzak, More, & Faraj, 2012; Meier, 2015; Pouthier, 2017) and in
8 inter-organizational (Quick & Feldman, 2014; Ybema et al., 2012) collaborations.
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11 For example, Meier (2015) studied how collaboration unfolded in two hospital wards in
12 Denmark. While in the oncology ward the patients became boundary objects around whom
13 relations among professionals from different organizational departments and medical specialties
14 were negotiated (as in the first category of collaborative boundary work), in the emergency ward
15 collaboration was achieved by “dissolving” existing hierarchical, organizational and disciplinary
16 boundaries and redrawing them around the “we” of the personnel present on a given day, as
17 manifested in their daily early morning huddle. Meier’s (2015) comparison of the two wards
18 highlights the role of the context and the task at hand on the mode of boundary work. In particular,
19 she observed how the increasing pressure on time, bed capacity and resources in the emergency
20 ward played a significant role in the process of dissolving and redrawing boundaries.
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24 Pouthier’s (2017) study of a cross-occupation team for palliative care and oncology patients
25 shows similar boundary dynamics to those observed by Meier (2015). In the hospital studied,
26 palliative care team members used griping and joking in meetings as recurrent ways of interacting
27 with each other and building feelings of belonging and solidarity. Griping and joking built on and
28 leveraged existing boundaries of various types – professional, disciplinary, organizational,
29 between medical staff and family – but at the same time by inviting “commiseration and laughing
30 along” (Pouthier, 2017, p. 3) they served as identification rituals in cross-boundary teams. We see
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3 in the data that while incidents of griping and joking contributed to downplaying *internal* team
4 boundaries, they might however reinforce *external* boundaries of the team, illustrating another way
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6 in which collaborative and competitive boundary relations come to be intertwined.
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10 Although not framed as boundary work, DiBenigno and Kellogg's (2014) study of
11 collaboration between nurses and patient-care technicians in two hospital units show a similar
12 process of dissolving boundaries as Meier (2015), but interestingly this occurred only in the unit
13 where cross-cutting demographics helped downplay differences in occupational status, emotional
14 rules, meanings and expertise between nurses and patient-care technicians. In the unit where
15 demographic differences of race, age and immigration status aligned with occupational roles, such
16 downplaying was not observed, suggesting again the importance of boundary intersectionality in
17 understanding the context and nature of competitive or collaborative boundary work.
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21 So far, all the examples of downplaying boundaries have been at the level of operational
22 work among professionals at the front line. Majchrzak et al.'s (2012) study, in contrast, focuses on
23 cross-functional teams mandated with novel tasks. The authors show how members do *not* spend
24 time explaining and debating their differences, but appear to "transcend" boundaries by focusing
25 on the task, voicing ideas, putting them together in a framework or "scaffold" that then guides their
26 work until it is no longer needed (a kind of fluid boundary object), while importantly, sustaining
27 engagement by minimizing personal differences and valuing all contributions, something that
28 might perhaps be related to Pouthier's (2017) notion of identification rituals.
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32 Finally, incidences of downplaying boundaries can occur in settings where, surprisingly,
33 groups appear interested not in affirming their difference and superiority, but in claiming similarity
34 to lower status groups: almost as a kind of reverse snobbery. This is manifested in Ybema et al.'s
35 (2012) study of a Dutch human-rights NGO and its relation to non-Western partners. Their
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3 ethnographic study highlights how both because of egalitarian ideological concerns and for
4 strategic partnership reasons, the NGO's members deliberately downplayed and, to use Pouthier's
5 (2017) words, depolarized the differences between them and their partners. Quick and Feldman
6 (2014) refer to a similar phenomenon in public service organizing where managers deliberately
7 underplay distinctions to provide room for community actors to put forward novel views.
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15 In sum, studies that focus on downplaying boundaries tend to suggest that boundary
16 tensions have possibly been overemphasized in previous research. Orlikowski (2002) has
17 suggested that working across boundaries is a form of knowing in practice that organization
18 members may enact fairly unproblematically. The conditions for such enactment seem, however,
19 as suggested by Orlikowski (2002) to be related to various mechanisms for building a sense of
20 shared identity despite differences, whether by organizing daily meetings (Meier, 2015), by griping
21 and joking rituals (Pouthier, 2017), by sharing cross-cutting demographic commonalities
22 (DiBenigno & Kellogg, 2014), or by deliberately suppressing differences that discourage openness
23 (Majchrzak et al., 2012; Quick & Feldman, 2014; Ybema et al., 2012).
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35 **Collaborative boundary work: Assessment and limitations**

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38 The collaborative boundary work literature reverses the emphasis we saw in the competitive
39 boundary work literature on constructing and defending barriers and distinctions for the purposes
40 of promoting privileged positions, focusing rather on how boundaries may be mobilized,
41 accommodated or overcome through various means in order to enhance collaboration and get work
42 done. At the same time, much of the literature points at the ironic nature of collaborative boundary
43 work. Just as the competitive boundary work literature often reveals the mobilization of alliances
44 and connections in the process of defending, contesting and creating boundaries (Garud et al.,
45 2014; Hazgui & Gendron, 2015; Huising, 2014; Mikes, 2011), the collaborative boundary work
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3 literature reveals how collaboration is often imbued with tensions that may be pasted over in
4 negotiated boundary work (Apeso-Varano & Varano, 2014; Barrett et al., 2012; Kellogg et al.,
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6 2006), absorbed by individuals in embodied boundary work (Azambuja & Islam, 2019; Levina &
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8 Vaast, 2005; Yagi & Kleinberg, 2011) and externalized or displaced in downplaying boundary
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10 work (Pouthier, 2017; Quick & Feldman, 2014). Although the emphases of the two sets of studies
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12 are different, the interpenetration of collaborative and competitive boundary relations seems
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14 endemic, and further research might more deeply explore some of its subtleties, and contingencies.
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20 ***Emergent opportunities: The nature and dynamics of collaborative boundary work***
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22 Building on the above, studies of collaborative boundary work sometimes point to the
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24 possibility of divergence between discourse and practice in orientations towards competition or
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26 collaboration. Members of cross-occupational teams, for example, might emphasize differences
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28 (competition) in private talk with researchers or with members of their “own” group, while at the
29
30 same time disregarding them in practice (collaboration) by performing or helping with each other’s
31
32 work (Allen, 1997; Apeso-Varano, 2013). This suggests also that the degree of purposefulness
33
34 and reflexivity concerning boundary work may vary. In everyday practices, boundaries may be
35
36 smoothly and pragmatically blurred, even though when asked, people may insist on the
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38 maintenance of clear boundaries. An explicit discussion of agency in boundary work is however
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40 lacking, with a few exceptions (e.g., Kaplan et al., 2017; Sage et al., 2016).
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44 Some studies in this category of boundary work also point to its relationality and a few have
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46 begun to look at interactions not simply between two groups, but between multiple groups
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48 negotiating complex arrangements around boundaries. For example, the boundary work performed
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50 by Barrett et al.’s (2012) pharmacists emerges in relation to the way in which both technicians and
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52 assistants work on boundaries and it is important to understand this multiplicity (see also Kellogg
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3 et al., 2006). In taking a relational approach to boundary work, several studies also highlight the
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5 role of materiality, which plays a more or less active role in negotiating, embodying and
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7 downplaying boundaries (Barrett et al., 2012; Kaplan et al., 2017; Kellogg et al., 2006; Levina &
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9 Vaast, 2005; Lindberg et al., 2017). These studies move beyond a conception of boundary objects
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11 as static devices for communication across pre-existing boundaries, to showing how materiality is
12
13 directly implicated in their constitution and negotiation. As we discuss later, there are further
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15 opportunities to consider the agential properties of material objects in future work.
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19 ***Emergent opportunities: Contingencies and variations in collaborative boundary work***
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22 As in the case of competitive boundary work, most studies described here are based on
23
24 single case studies and their purpose is to understand the micro-practices of boundary work in
25
26 specific sites rather than to compare how contextual factors influence ways of performing
27
28 collaborative boundary work or its effectiveness. However, there are some exceptions. For
29
30 example, the studies by DiBenigno and Kellogg (2014), Liberati (2017) and Meier (2015) compare
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32 boundary negotiations and accommodations between similar occupational groups in different
33
34 settings. These studies reveal tellingly that field-level occupational boundaries are not
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36 deterministic. Local situated conditions or demographic characteristics (DiBenigno & Kellogg,
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38 2014) may make a difference to the way in which collaborative boundary work is enacted. Moving
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40 beyond the context of occupational groups, Levina and Vaast's (2005) comparative case study
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42 suggests that what makes *embodied* boundary work successful is the ability and willingness
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44 boundary workers to engage with others and to contextualize boundary objects in different fields.
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46 Apart from these few exceptions, however, the literature on collaborative boundary work does not
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48 systematically address variations in the performance of boundary work based on different
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50 conditions and contingencies, suggesting multiple opportunities for future research. Moreover,
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3 there is a need for deeper analysis of the theoretical mechanisms (e.g., patterns of interdependence;
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5 power relationships) driving some of the differences observed.
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8 9 **Configurational Boundary Work: Working *through* Boundaries**

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11 As described above, the competitive boundary work literature focuses on how groups
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13 construct boundaries that confer legitimacy, power and privilege on themselves, while the
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15 collaborative boundary work literature focuses on how groups negotiate or otherwise build
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17 connections at boundaries to get their work done. In contrast, we use the term “configurational
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19 boundary work” (or working *through* boundaries) to refer to research in which managers,
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21 institutional entrepreneurs, or leaders work to reshape the boundary landscape of others to orient
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23 emerging patterns of competition and collaboration, often combining elements of both.
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27 Indeed, configurational boundary work has three main features. First, it involves people
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29 acting at a distance (*from outside*) directly or indirectly to influence the boundaries affecting others
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31 – the locus of agency is at higher level (see the schematic representation in Table 1). Second, and
32
33 relatedly, the focus is on how patterns of differentiation and integration among sets of people or
34
35 ideas within or around organizations and fields may be manipulated in order to ensure that certain
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37 activities are brought together, while others are at least temporarily kept apart, generally for the
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39 purpose of enabling effective collective action of others and at a distance. In other words, these
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41 studies involve using boundaries to shift or reconfigure patterns of interaction. Third, the studies
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43 in this category focus somewhat less on the boundaries themselves, and somewhat more on the
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45 potentialities of the “spaces” bounded by them to serve collective purposes. Boundary work thus
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47 focuses on developing and mobilizing such spaces (which like boundaries can be physical, social,
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49 temporal or symbolic) (Hernes, 2004; Lamont & Molnár, 2002) to influence the various forms of
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51 interaction taking place within and around them.
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3 The spaces generated through configurational boundary work may be intra-organizational
4 (Bucher & Langley, 2016; Cross, Yan, & Louis, 2000; Kellogg, 2009; Stjerne & Svejnova, 2016),
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6 inter-organizational (Mørk et al., 2012; O'Mahony & Bechky, 2008; Oldenhof, Stoopendaal, &
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8 Putters, 2016) or across fields or domains of activity (Cartel, Boxenbaum, & Aggeri, 2019; Frickel,
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10 2004; Granqvist & Laurila, 2011; Liao, 2016; Llewellyn, 1998). We now explore in more depth
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12 the historical roots of this smaller but developing body of work, and consider adjacent literatures.
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15 16 17 **Historical roots and adjacent literatures** 18

19 The configurational boundary work literature builds on a variety of theoretical resources
20 including to some degree those mentioned above (Bourdieu, 1984; Gieryn, 1983; Lamont &
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22 Molnár, 2002). However, one particular source of inspiration that was not observed for other
23
24 categories is social movement theory, and in particular two key conceptual tools derived from it.
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26 The first concept is the notion of “framing” in which people construct discursive frames aimed at
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28 strategically influencing the way others construct social problems and potential solutions (Benford
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30 & Snow, 2000; Creed, Langstraat, & Scully, 2002). The usefulness of the framing literature for
31
32 configurational boundary work lies in how framing may be used by institutional entrepreneurs to
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34 recruit others towards developing new boundaries and spaces for collective action (Frickel, 2004;
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36 Granqvist & Laurila, 2011; Howard-Grenville, Nelson, Earle, Haack, & Young, 2017).
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42 The second concept originally from social movement theory that has been inspirational for
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44 the configurational boundary work literature is the notion of “free spaces” (Gamson, 1996;
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46 Polletta, 1999) defined as small-scale bounded social settings separated from dominant groups
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48 where interactions can take place in a different way from those in mainstream society, and where
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50 people can mobilize for action. This idea was taken up by Kellogg (2009) and used in a study of
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52 organizational change. Drawing a parallel with the concept of “free spaces,” she developed the
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3 notion of “relational spaces” to describe social settings characterized by isolation (i.e., separation
4 from influence by opponents), interaction, and inclusion of reformers from all occupational groups
5 affected by the change. She argued that relational spaces enabled change to take root. While
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7 Kellogg (2009) does not use the notion of boundary work explicitly in her study, her concept of
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9 “spaces” subsequently inspired other authors who do describe this phenomenon using boundary
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11 work language (Bucher & Langley, 2016; Cartel et al., 2019; Zietsma & Lawrence, 2010). A
12
13 related body of research relevant to configurational boundary work are studies that incorporate
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15 reference to “boundary organizations” (Guston, 2001) as a particular form of organized and
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17 bounded spaces for achieving new forms of interaction.
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24 Finally, an adjacent and potentially voluminous literature relevant to this category is that
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26 focusing on organizational design, since configurational boundary work is fundamentally about
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28 reshaping the spaces and boundaries for organized activity. However, the vast majority of the
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30 organizational design literature does not take a dynamic processual perspective on spaces and
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32 boundaries as subject to “work” but regards boundaries as fixed and immobile, once they have
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34 been conceived. The boundary work perspective is valuable precisely because it draws attention
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36 to the fluid and open-ended nature of organizing. Along the same lines, Oldenhof et al. (2016, p.
37
38 1206) emphasize the interest of shifting the focus from boundaries to boundary work as it “allows
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40 us to see how organizational classifications, e.g. ‘top/bottom’ and ‘internal/external,’ are produced,
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42 renegotiated, and accepted as the status quo within and between organizations. However, this
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44 status quo is far from permanent.” The configurational boundary work literature reviewed in this
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46 section (see Appendix 3 in the supplementary materials) emphasizes the ongoing organizing
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48 practices that redistribute activities within and across boundaries, enacting emergent stability and
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50 change in those categories.
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Modes of configurational boundary work

We identified three subcategories of contributions relevant to configurational boundary work that we label *arranging boundaries*, *buffering boundaries* and *coalescing boundaries*. Each of these subcategories implies work aimed at the reconfiguration of interaction patterns in relation to pre-existing boundaries to serve collective purposes, but to different degrees and in somewhat different ways. The relevant studies are summarized in Appendix 3 and reviewed below.

Arranging boundaries

The first type of boundary work within this category focuses on work performed to refocus interactions in order to do new things or the same things differently. We call this subcategory “arranging boundaries” to signal that agency in this case clearly comes from *outside* the boundaries and spaces being created to influence activities. Studies in this category show for example how the creation of temporary boundaries and spaces within an organization or an organizational field enables acting “outside the box”, since isolation from regular activities and new patterns of inclusion can allow actors to achieve things collectively that otherwise might not be possible.

One of the more influential papers discussing this type of boundary work is Zietsma & Lawrence’s (2010) field study of the “war of the woods” in British Columbia, where they describe how forestry companies and other stakeholders became engaged in boundary work in response to the growing social and environmental concerns raised by environmentalists and representatives of the local community. They show how in an attempt to resolve a longstanding and costly conflict between competing interests, one of the logging companies decided to invite external actors to collaborate in a series of experimental temporary projects, separate from their day to day activities, aimed at testing and evaluating alternative logging practices. Zietsma and Lawrence (2010) coin the term “*experimental spaces*” to describe these temporary projects which involved activities such

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3 as experimenting with selective harvesting practices and secretly negotiating with counterparts.
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5 The creation of a bounded experimental space shielded these activities from criticism and
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7 sanctions, motivated actors to participate, and gave them the freedom to jointly test and elaborate
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9 innovative solutions, which later played an important in role in the transformation of forest
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11 harvesting practices in the broader organizational field. Similarly, Cartel et al. (2019) illustrate
12
13 how the creation of social and symbolic boundaries around a temporary space for innovative
14
15 experimentation in the carbon market, facilitated a climate of trust among field actors allowing
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17 them to try new things together without irrevocably committing to those actions outside this
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19 temporary, experimental space, a necessary condition to make experimentation possible.
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24 While the above studies are located at the institutional level, Bucher and Langley (2016)
25
26 used similar notions to study two cases of change in patient process routines in hospitals. They
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28 showed how boundary work was performed by managers to create different kinds of temporary
29
30 spaces for interaction. By determining who should be involved, for how long, where, and in what
31
32 form, they established a set of boundaries that allowed for the creation of alternating *reflective* and
33
34 *experimental* spaces, where organizational members could distance themselves from everyday
35
36 practices and develop new ideas (in reflective spaces) and reconnect these to everyday work (in
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38 experimental spaces). These alternating types of spaces were continually redeveloped through
39
40 ongoing boundary work, often from within prior spaces, and they played a significant role in
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42 enabling change by overcoming established modes of interaction that previously inhibited it. The
43
44 practice of rearranging spaces to change forms of interaction is also a theme in Oldenhof et al.'s
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46 (2016) study of a health care reform program in the Netherlands, where the boundary work of
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48 middle managers catalyzed inter-organizational change.
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3 All these studies reveal the potentially transformative role of configurational boundary work
4 in overcoming what Zietsma and Lawrence (2010) call ‘the paradox of embedded agency’ and
5 what Bucher and Langley label the ‘puzzle of recursiveness’ (Bucher & Langley, 2016). This
6 paradox concerns the question of how people embedded in taken-for-granted patterns of practice
7 and power relationships (at institutional or organizational level respectively) can transform those
8 practices, even as they are inevitably influenced by them. Flexibly rearranging the physical, social,
9 temporal and symbolic boundaries that isolate people and ideas from one another can contribute
10 to enabling the reorientation of practices. As Stjerne and Svejenova (2016) suggest, this kind of
11 configurational boundary work may be particularly prevalent and crucial in project-based
12 organizations where boundaries (between projects and the host organization, between temporal
13 time periods) are always in flux, and there is a need to ensure both the autonomy and effectiveness
14 of project work as well as the connection to the larger organization.
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30 ***Buffering boundaries***

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32 The second subcategory of configurational boundary work refers to boundary shaping
33 performed to accommodate collaboration among organizations from incompatible social worlds
34 or/and actors with competing interests. This is done by creating dedicated spaces to mediate such
35 relations, a practice that we label “buffering boundaries.” Such spaces that Guston (1999)
36 described as *boundary organizations* are designed to continually produce boundary work that
37 enables collective action, while at the same time, allowing participants to remain behind their
38 preferred established boundaries, and thus deliberately sustaining *both* competitive *and*
39 collaborative boundary relations (Guston, 2001; Mørk et al., 2012; O'Mahony & Bechky, 2008).
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51 The notion of boundary organization was first used by Guston (1999) in his study of field
52 actor’s involvement in boundary work in the implementation of a knowledge transfer policy in the
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3 intramural laboratories of the National Institutes of Health in the US. The study focused on the
4 role and activities of the Office of Technology Transfer (OTT), an organization located between
5 policy makers and scientists responsible for the evaluation. The authors describe the OTT as a
6 “Janus faced” boundary organization simultaneously directed towards and involved with both
7 scientists and policy makers. The boundary organization enacted a dual, combined social order,
8 enabling policy makers and scientists to bridge social worlds while giving both an opportunity to
9 construct their boundaries in ways favorable to their own perspectives.
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19 Similarly, O'Mahony and Bechky (2008) studied projects in an open-source software
20 community where boundary work was initiated to establish collaborative relations between
21 organizations with conflicting values and interests, while enabling the maintenance of these
22 competing interests. They show how members of open source communities and employees of
23 private companies interacted collaboratively within the open source community's webpage,
24 forums and e-mail lists through participation in a boundary organization that ensures common
25 governance, voice and representation. However, within their group, they also competed through
26 actions safe-guarding membership, ownership and control of the production of software code that
27 took place within the boundary organization. We see similar phenomena occurring in Caine's
28 (2016) study of boundary relations between government and first nations groups mediated by an
29 NGO that manages bounded collaborative relations despite divergent interests as well as Perkmann
30 et al.'s (Perkmann & Schildt, 2015) study of the “Structural Genomics Consortium,” a boundary
31 organization mediating between universities and the pharmaceutical industry.
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49 A somewhat different example is provided Mørk et al. (2012) who examine the boundary
50 work performed by a group of physicians to establish a boundary organization, in the form of a
51 new independent R&D department at a Norwegian hospital. This department would accommodate
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3 innovative procedures, using cutting edge technology and involving experts from a variety of
4 medical communities as well as engineers and physicists. However, rather than focusing on the
5 boundary work performed by and within the boundary organization once created, Mørk et al.
6 (2012) center their attention on the boundary work (or what the authors call “boundary
7 organizing”), involved in creating this boundary organization as the means to transform scientific
8 breakthroughs into functional medical practices. This involved handling multiple boundaries,
9 facilitating mutual benefit (sometimes through shifting boundaries between disciplines), and
10 mutual adaptation of practices
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21 In sum, a particular form of configurational boundary work that maintains competitive and
22 collaborative forces in paradoxical equilibrium involves buffering boundaries through the creation
23 of boundary organizations. This is an organizational form that seems likely to create particular
24 challenges for its members who in turn need to manage the collaborative/ competitive tension,
25 maintaining trust on both sides (O'Mahony & Bechky, 2008; Perkmann & Schildt, 2015).
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32 ***Coalescing boundaries***

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35 In contrast to the two previous types of configurational boundary work which involve using
36 boundaries and spaces to orient existing activities, we also identified a third subset of studies in
37 which established boundaries are reshaped by coalescing existing activities into newly redefined
38 domains or spaces. Studies in this subcategory that we call “coalescing boundaries” show how
39 elements from existing domains can be integrated or fused into new or expanded ones (Frickel,
40 2004; Granqvist & Laurila, 2011; Howard-Grenville et al., 2017; Suddaby, Saxton, & Gunz, 2015),
41 often combining elements of both collaborative and competitive processes.
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51 A more top-down approach to this type of boundary work is illustrated by Llewellyn's
52 (1998) study of public reform of social services in Scotland aimed at increasing cost efficiency.
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3 Llewellyn shows how formerly rigid symbolic boundaries between the domains of “social service
4 work” and “cost control” were gradually broken down, not without resistance, by rhetorical moves,
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6 the creation of new positions, shifts in budgetary responsibility and other means of ensuring the
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8 accommodation of cost awareness in everyday social work, coalescing the boundaries between
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10 previously distinct domains.
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15 An apparently more democratic and harmonious example of coalescing boundaries is
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17 represented by Frickel’s (2004) historical study of building the “inter-discipline” of genetic
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19 toxicology by inventing and renegotiating porous disciplinary, organizational, and epistemological
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21 boundaries that encouraged multi-disciplinary interaction. The study draws on documents and the
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23 concept of framing from social movement theory (Benford & Snow, 2000) to show how scientists
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25 connected their inter-disciplinary project to diverse audiences using strategies of “frame
26
27 amplification,” (clarifying a problematic issue), “frame extension” (broadening boundaries to
28
29 encompass diverse interests) and “frame translation” (showing how the proposed solution might
30
31 resolve others’ concerns). These framing processes established the credibility of genetic
32
33 toxicology knowledge, and enabled the formation of new networks, organizations, and practices
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35 that came to define the emerging field. Frickel (2004) argues that as a consequence, the inter-
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37 discipline maintained itself through interaction with other fields, demanding boundaries that were
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39 intentionally permeable. Such boundary work thus interestingly emphasizes the strength of “weak”
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41 boundaries, something also revealed in a study of framing processes in the development of green
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43 chemistry (Howard-Grenville et al., 2017) where tensions between proponents of rigid definitions
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45 and proponents of versatility hold the concept together in what the authors call a “stable condition
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47 of pluralism.”
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3 The dynamics of framing and boundary work is also shown in Granquist and Laurila's
4 (2011) study of how US nanotechnology coalesced as a scientific field as an interplay between
5 fiction, policy and science which involved different kinds of framing processes and boundary
6 work. The authors describe how futurists and fiction movements influenced science and shaped
7 the boundaries and substance of the emerging field. However, within the established scientific field
8 the co-optation of the non-scientific rhetoric gave rise to perception of a 'compromised' field
9 which jeopardized its internal legitimacy. The paper shows the delicate and shifting nature of
10 boundary work in a situation where links to wider culture initially support a group's development,
11 but might ultimately damage its status in relation to other reference groups. Again, we see the
12 porous nature of the emerging boundaries as they coalesce. Another more recent study of the same
13 nanotechnology field (Grodal, 2018) reveals the recursive relationship between symbolic
14 (discursive) boundary work and social membership. This study explains the dynamic nature of
15 field boundaries in nanotechnology in terms of tensions between the identity and resource motives
16 of different communities. Grodal (2018) suggests that the futurist community first enlarged
17 symbolic definitions of nanotechnology to attract resources and members, but then found itself
18 competing for those resources with groups whose identities were not fully aligned with their own
19 (scientists), resulting in subsequent boundary work to narrow symbolic and social boundaries.
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42 Similar forms of uneasy coalescence are evident in Liao's (2016) study of boundary work
43 occurring around the definition of "augmented reality" (AR), an initiative aimed at constructing a
44 new community and research field. Definitions of AR were here construed as attempts to expand
45 the authority of initiating participants, to stake a claim to a new space, and to serve as a form of
46 membership negotiation. However, disputes arose in applying definitions, and different
47 interpretations were proffered by new stakeholders entering the field. For example, business
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3 interests attempted to redefine and diminish the importance of academic definitions. Definitions
4 and the symbolic and social boundaries that go along with them are shown to be temporarily settled
5 and then unsettled as they move from one “field configuring event” (i.e., a meeting of participants
6 discussing the shaping of the field) (Lampel & Meyer, 2008) to another. The porosity and
7 ambiguity of boundaries of this coalescing but continuously reconfiguring field are quite clear
8 (Frickel, 2004). What is not clear is whether or not this is a strength. Certainly, boundary work is
9 clearly endemic in communities such as these.

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12 In summary, this group of studies emphasizes how configurational boundary work can be
13 used to bring together groups with potentially divergent and competing perspectives and goals, by
14 coalescing established boundary definitions and constructing new domains. However, holding
15 together groups with different and potentially competing perspectives may require the maintenance
16 of porous and ambiguous boundary constructions, that can sometimes be fragile and temporary
17 (Frickel, 2004; Granqvist & Laurila, 2011; Grodal, 2018; Howard-Grenville et al., 2017).

32 **Configurational boundary work: Assessment and limitations**

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35 Within this category of configurational boundary work, boundaries are typically seen as a
36 functional tool for organizing human activities, combining in different ways the benefits of
37 differentiation (e.g., by limiting interference from forces for disruption or competition), with the
38 benefits of integration (e.g., by creating protected space for experimentation, socialization and
39 collaboration). Indeed, the studies in this category illustrate the affinity of the notion of boundary
40 work with a processual view of organizational design (Weick, 1979), emphasizing the fluidity and
41 open-endedness of organizing, manifested in forms such as temporary experimental spaces,
42 boundary organizations, and porous coalescing and reconfiguring fields. At the same time, these
43 studies show how boundaries can be a managerial resource to achieve other objectives. Boundaries
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3 are not simply a source of legitimacy and self-protection (as in competitive boundary work) nor a
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5 juncture to be aligned (as in collaborative boundary work), but also a tool to allow other things to
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7 happen because of their capacity to separate or bring together particular people, objects and ideas
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9 into new configurations. We see that boundaries may be “used” by agents such as managers and
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11 institutional entrepreneurs to orient the activities of others.
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15 This group of studies is also particularly intriguing because it integrates the forces driving
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17 the other two. Specifically, ongoing tension between competition and collaboration is manifested
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19 in different ways for each of these forms of boundary work. In the first subcategory, arranging
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21 boundaries in certain ways results in shifts in the locus of competition and collaboration which can
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23 renew potential for collective action (Bucher et al., 2016; Cartel et al., 2019; Oldenhof et al., 2016;
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25 Zietsma & Lawrence, 2010). In the second subcategory, competition and collaboration are
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27 buffered, or kept apart through the work of boundary organizing (Mørk et al., 2012; O'Mahony &
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29 Bechky, 2008). In the third subcategory, the work involved in coalescing boundaries embeds
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31 competitive and collaborative boundary moves in an ongoing dance, in which porous boundaries
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33 are preferred and rigidity avoided to sustain an acceptable degree of coalescence (Frickel, 2004;
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35 Granqvist & Laurila, 2011; Grodal, 2018; Howard-Grenville et al., 2017; Liao, 2016). This body
36
37 of work thus reveals the richness of interaction between competitive (exclusive) and collaborative
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39 (inclusive) processes circulating around boundaries and inherent to boundary work, something that
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41 we noted with the other categories too, but to a lesser degree.
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47 ***Emerging opportunities: The nature and dynamics of configurational boundary work***
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49 Because this body of research often involves multiple stakeholders and considers processes
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51 evolving over long periods of time, it begins to widen the scope of the boundary work perspective
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53 to understanding large scale processes at broader organizational and institutional levels. Yet, the
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3 fine-grained everyday boundary talk-in-interaction that we sometimes saw in the other two
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5 categories is less visible, making the boundary work concept more abstract, coarse-grained and
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7 apparently black-boxed. The configurational boundary work literature could be enriched through
8
9 a more fine-grained approach to the actual work itself.
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12 A second intriguing and distinctive feature of some the configurational boundary work
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14 studies, is the emphasis on temporary or “temporal boundaries” (Bucher & Langley, 2016; Cartel
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16 et al., 2019; Zietsma & Lawrence, 2010), and the particular role they play in enabling new activities
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18 to occur, which are then reintegrated into unbounded temporal spaces. This suggests that the notion
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20 of temporal boundary work might offer rich opportunities for further study, focusing for example
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22 on how the manipulation of time, in terms of deadlines, schedules and windows of opportunity
23
24 could play a significant role in the life of groups, occupations and organizations.
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28 ***Emergent opportunities: Contingencies and variations in configurational boundary work***
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30 Comparative studies are even less common for the configurational boundary work literature than
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32 for the other two types. When multiple case studies have been included in research designs (Bucher
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34 & Langley, 2016; Caine, 2016; O'Mahony & Bechky, 2008; Stjerne & Svejenova, 2016), the
35
36 emphasis has mainly been on the literal replication of common insights, rather than on the
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38 explanation of differences. Nevertheless, Bucher and Langley (2016) compared two different
39
40 examples of routine change, and observed that blockages occurred when managers failed to
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42 alternate between the creation of different types of spaces (experimental and reflective), each
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44 playing a different role in moving the change process forward. Kellogg (2009) also compared two
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46 change processes, and showed how change was more likely for cases where the boundaries around
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48 relational spaces were less porous, providing room for change agents to construct mutual support
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3 without contamination from defenders of the status quo. Clearly, there are opportunities to further
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5 develop knowledge about the contingencies and variations of configurational boundary work.
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8 9 **Discussion and Directions for Future Research**

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11 In this paper we critically examined the literature on boundary work in organization and
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13 management studies considered broadly. We found that authors discuss three conceptually distinct
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15 but inter-related forms of boundary work that we label *competitive* boundary work, *collaborative*
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17 boundary work and *configurational* boundary work. Studies of competitive boundary work
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19 foreground how agents construct, defend or extend boundaries to distinguish themselves from
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21 others (Allen, 2000; Arndt & Bigelow, 2005; Bucher et al., 2016; Burri, 2008; Garud et al., 2014;
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23 Gieryn, 1983; Santos & Eisenhardt, 2005). They do so to maximise their social position and status,
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25 obtain resources and reproduce or contest existing power relationships. Studies of collaborative
26
27 boundary work focus on how agents negotiate, blur or realign boundaries in interaction to pursue
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29 collaborative aims and get their everyday work done (Apesoa-Varano, 2013; Azambuja & Islam,
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31 2019; Barrett et al., 2012; Lindberg et al., 2017; Pouthier, 2017; Yagi & Kleinberg, 2011). Finally,
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33 studies of configurational boundary work consider how boundaries may be deliberately
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35 manipulated in order to ensure that certain activities are brought together within bounded spaces,
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37 while others are at least temporarily kept apart, for the purpose of enabling effective collective
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39 action (Bucher & Langley, 2016; Granqvist & Laurila, 2011; Guston, 2001; O'Mahony & Bechky,
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41 2008; Zietsma & Lawrence, 2010). In the rest of this concluding section, we discuss some of the
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43 more general features of this body of work building on the insights and limitations we identified
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45 earlier, and we suggest a number of important opportunities for future research. Figure 1 below
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47 synthesizes our portrait of the boundary work literature and identifies the main foci for future
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49 research that we explore in more detail in this section.
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Insert Figure 1 here

Boundary work as multifaceted and recursive

A first observation which stems from our review is that the three types of boundary work are intricately intertwined in practice. It appears that even the most divisive attempts to create boundaries have to contend with the fact that interdependence is a reality in organizational and social life. Negotiation and mutual accommodation between groups, occupations and professions are therefore inescapable in order to get things done. Boundary work is thus almost never wholly competitive or collaborative. Although in any particular study, one type of boundary work may be foregrounded, different and seemingly opposite types of work, such as demarcating and blurring boundaries often co-exist (Allen, 2000; Azambuja & Ancelin-Bourguignon, 2017; Ellis & Ybema, 2010; Farias, 2017; Hazgui & Gendron, 2015; Meier, 2015; Mikes, 2011; Pouthier, 2017).

One type of work can also influence or generate another. For example, when actors carry out configurational boundary work, they generate distinctions that can become imbued with value, status and power for certain groups inciting them to engage in competitive boundary work (Granqvist & Laurila, 2011; Grodal, 2018; Liao, 2016). At the same time, the creation and reification of boundaries through competitive boundary work may generate situations demanding collaborative boundary work (Mikes, 2011; Quick & Feldman, 2014; Zietsma & Lawrence, 2010), which may in turn shift negotiated orders and lead to calls for further configurational boundary work. The interaction between the three types of work is captured in Figure 1.

Our review also suggests that once we get close to the coalface of organizational life, “boundaries” start to look much more porous and fluid than they appeared from far away. Boundary work in turn emerges as inherently tactical and situated. Why and how actors engage in particular forms of boundary work and how agents mutually construct a “negotiated order”

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3 (Strauss, 1978) is strongly influenced by local conditions as some studies have explicitly revealed
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5 (Liberati, 2017; Meier, 2015). How agents enact demarcations and distinctions needs to be studied
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7 in situ as the success of boundary work is often reliant on micro-strategies and subtle nuances, as
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9 illustrated by some of the ethnographic studies in our review (Apesoa-Varano, 2013; Bechky,
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11 2003, 2006; Pouthier, 2017; Rodriquez, 2015). We think that more fine-grained work is needed to
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13 authentically capture the sayings and doings that people engage in to influence demarcations
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15 shaping their social context. Moreover, such fine grained studies of boundary work would benefit
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17 from novel methodologies such as video-analysis, shadowing and multimodal approaches.
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19 Opportunities are also offered by emerging technologies such as tracking devices and proximity
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21 sensors that may offer new vista on the phenomenon by offering larger sets of interactional data
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23 that can complement in depth observation.
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29 At the same time, we also need more studies with an explicitly comparative focus that can
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31 further illuminate the contingencies that may influence the enactment of boundary work in similar
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33 settings, and help us understand when and where it may be more consequential in positioning
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35 actors favorably against their competitors (competitive boundary work), in enabling collaboration
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37 (collaborative boundary work), and/or in orienting patterns of collective action from the outside
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39 (configurational boundary work). A literature synthesis such as ours can identify commonalities
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41 and differences across different studies, but there would be value in developing more research
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43 designs that are explicitly oriented towards replication and comparison, such as those of Barrett et
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45 al. (2012), Bucher and Langley (2016), Liberati (2017), Mikes (2011), O'Mahony and Bechky
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47 (2008), and Santos and Eisenhardt (2005).
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51 **Boundary work, reflexivity and agency**

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3 Future work is also required to rethink the role of agency in boundary work by examining
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5 its more or less reflexive character. Our review suggests that the degree of purposefulness or
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7 reflexivity may vary considerably. For example, there is a clear difference between the highly
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9 intentional and planned activities of the physician entrepreneurs in Mørk et al.'s (2012) study of
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11 the creation of a boundary organization, and the everyday pre-reflexive boundary interactions
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13 nurses and doctors undertake in their daily work (Allen, 1997; Apesoa-Varano & Varano, 2014;
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15 Sanders & Harrison, 2008).
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19 While many of the papers we reviewed (especially in the competitive boundary work
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21 section) treat the actors involved in boundary work essentially as members of "in-groups," intent
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23 on supporting parochial interests,⁶ others suggest that the reality of living at the boundary is rather
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25 different. In many circumstances, boundary work is a thoroughly mundane performance, carried
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27 out in the background and pre-reflexively without being foregrounded and thematized in terms of
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29 long term calculation (Azambuja & Islam, 2019; Levina & Vaast, 2005; Yagi & Kleinberg, 2011).
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31 Only occasionally may people begin to work together strategically, collectively and deliberately,
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33 perhaps with the aim of shifting boundaries in their favor (Allen, 2000; Helfen, 2015), perhaps to
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35 protect threatened turf (Ezzamel & Burns, 2005; Garud et al., 2014; Helfen, 2015; Suddaby &
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37 Greenwood, 2005), perhaps to develop new ways to collaborate (Barrett et al., 2012; Lindberg et
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39 al., 2017) or with a view to reshaping a field (Frickel, 2004; Liao, 2016; Mørk et al., 2012). One
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47 ⁶ The notion of in-group vs. out-group categorization is a phenomenon widely studied by scholars of social identity
48 theory (Tajfel & Turner, 1986). The theory suggests that when individuals are grouped together (even in random
49 situations) they tend to develop rather quickly group identities. This involves both the categorization of one's "in-
50 group" with regard to an "out-group" and the development of forms of positive bias (both discursive and practical)
51 toward in-group members vis-à-vis the out-group. This approach has a strong individual orientation grounded in
52 psychological research traditions that are different from that of most boundary work scholars, who eschew the
53 notion of cognition as separate from action in consonance with the practice-based view. Nevertheless, the linkage
54 with social identity theory and in-group/ out-group dynamics might offer another promising direction for future
55 research. We thank one of our editors for pointing us towards this idea.
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3 question raised by our review is therefore whether the prevalence of studies focusing on the latter
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5 is a reflection of what happens most in the field or simply due to researchers' propensity to focus
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7 more on situations characterized by some kind of drama (Franco, Malhotra, & Simonovits, 2014).
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10 Our view, however, is that identifying boundary work either with routine activities or with
11
12 exceptional events when conflict and contradictions come to a head would be a mistake. These
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14 two forms of boundary work constitute in fact different facets of the same phenomenon.
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16 Boundaries are enacted through both types of work even though the literature we reviewed focuses
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18 either on one or the other, but almost never both. To resolve this apparent dichotomy the study of
19
20 boundary work needs to embrace a relational and processual views of agency that does not contrast
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22 mundane routinized activity and purposefulness or reflexivity – as is common in the individualist
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24 and calculative conceptions of agency that prevail in management studies. Emirbayer and Mische
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26 (1998) for example, suggest that human agency as practical and situated engagement always
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28 encompasses elements of repetition, projection toward the future and practical evaluation of
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30 possible immediate and future consequences. Boundary work is thus always agential, projective
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32 and purposeful even when it operates in the background and is not the focal object of individual
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34 and collective attention (see also Cardinale, 2018). Agency and reflexivity are ubiquitous in
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36 boundary work although they assume different forms and are played out differently. The dynamic
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38 interplay among these dimensions and the temporal dynamic between the more or less reflexive
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40 character of this work constitute an empirical question. Accordingly, more work is needed to
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42 foreground the recursive interaction between more strategic and collective boundary work
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44 initiatives and the everyday tactical performative boundary work carried out in micro-interactions.
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Boundary work beyond human agents

Building on the above, a further way to enrich the boundary work concept would be to question the current assumption that boundary work is attributable mostly if not exclusively to human agents. This of course does not mean that we ascribe human like agency and intentionality to machine and objects. Instead it suggests the need to decenter our view of agency in boundary work. A number of authors such as Pickering (2010), Barad (2003), Latour (2005) and Orlikowski and Scott (2008) have convincingly argued that agency, understood as the capacity to act, emerges at the encounter between humans, artefacts, texts, and discourses, and does not pre-exist such encounters. For example, the capacity of a modern doctor to cure a patient is not a stable quality or capacity that the actor holds. The healing agency of modern clinicians emerges instead from the encounter and ‘intra-action’ (Barad, 2003) between educated human bodies and minds (the doctors but also patients and other health professionals), medical technologies and medicines, clinical spaces, the discourse of modern medicine, the local health policy and the state of the local economy (amongst many other things). Although we traditionally attribute head status to the human agent and complementary status to the rest (Taylor, Groleau, Heaton, & Van Every, 2001), it is difficult to ignore that the work of healing is distributed across all these different constituents.

We suggest that the same can be applied to the study of boundary work and we see the beginnings of some more subtle thinking about materiality in a few of the studies reviewed here. For example, Barrett et al. (2012) and Lindberg et al. (2017) show new technologies to be important agents in orienting the reconstitution of boundaries among health care occupational groups. Kaplan et al. (2011) use the term “symbiont” to capture the hybrid socio-material agency exerted by science students with deep knowledge of specific scientific instruments in enabling interdisciplinary collaboration in nanotechnology.

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3 Abandoning a human-only perspective in boundary work allows us for example to
4 acknowledge that the “social” and “symbolic” boundaries that we encounter in our daily lives are
5 increasingly performed materially and digitally. Social, racial and professional boundaries are
6 increasingly inscribed in decision making algorithms such as those that decide whether we are
7 worthy of credit but also whether we are potential criminals (Lum & Isaac, 2016). For example,
8 the professional boundaries between doctors, nurses and other healthcare professionals discussed
9 by Allen (1997), Bach et al. (2012) and DiBenigno and Kellogg (2014) are these days often at least
10 partly digitally mediated, as in the case of differential access to patient data through electronic
11 patient records (Goorman & Berg, 2000). Once we re-conceptualize boundaries in material and
12 digital ways we can start asking questions that are notably rare in the literature we surveyed
13 (despite the exceptions mentioned above). What does boundary work look like when boundaries
14 become materially and digitally mediated? How can boundaries be negotiated or contested when
15 they are inscribed in algorithms?
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33 New questions are not however only limited to the role new technologies. For example,
34 once we relax the assumption that boundaries are made by people we can start asking how
35 boundaries can be generated by the different temporalities embedded in practices. Consider for
36 example the distinctions between those who have a permanent job and those who live precariously;
37 or those who work 9-5 or who work at night. What sort of boundary work is triggered by these
38 distinctions? Embracing a more socio-material and open view of boundaries conceived as
39 junctures where practices meet certain differences become salient makes us sensitive to new types
40 of boundaries and boundary work that may constitute promising topics for future research.
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Boundary work in context

Many of the papers examined in our review analyze work at a single boundary at a time, e.g., the boundary between nurses and doctors (Allen, 1997), accountants and buyers/merchandisers (Ezzamel & Burns, 2005), scientists and anti-scientists (Garud et al., 2014) etc. Yet renegotiating the boundaries between two occupational communities or roles may in fact create tensions with other groups and occupations. This in turn may facilitate but also hamper the original effort. We do see certain studies beginning to consider multiple boundaries at a time (Barrett et al., 2012; Bechky, 2003; Rodriguez, 2015; Zietsma & Lawrence, 2010), but future work could develop this further to consider nexuses and ecologies of boundaries in situ, studying how changes on one boundary reverberate elsewhere. In addition, boundary work studies could also devote more attention to the dynamic linkages between different types of boundaries (e.g., symbolic and social) (Grodal, 2018). While analysing multiple types of boundaries among multiple stakeholder groups can be difficult in empirical research, neglecting these distinctions is likely to miss the complexity of social life in and around organizations.

Conceiving boundaries as mutually connected goes hand in hand with increasing attention to the social and historical conditions within which boundary work is performed. According to our review, very few studies consider boundary work within the wider historical context and broader societal dynamics within which such work is conducted on the ground. This applies even for most of the recent studies that adopt an intersectionality sensitivity and consider the boundary work required to accommodate at the same time multiple distinctions, e.g., gender and occupation (Persson, (2010) or gender, occupation and ethnicity (DiBenigno & Kellogg, 2014). Consequently, even the most sophisticated studies of boundary work rarely establish connections between local micro-level instances of boundary work and broader societal phenomena. Some studies look at

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3 institutional level boundary work (Hazgui & Gendron, 2015; Helfen, 2015; Llewellyn, 1998;
4 Suddaby & Greenwood, 2005; Zietsma & Lawrence, 2010), while others focus on situated
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6 boundary work in the workplace. However, the two domains of study (“levels”) tend to be treated
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8 separately and we know little about the actual connections and mutual influences between the two.
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12 Hence, we suggest that future work will be necessary to explore how the local “negotiated
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14 order” (Strauss, 1978) is a reflection of wider societal transformations and to what extent local
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16 boundary work (especially of the competitive and collaborative variety) constitutes an instance of
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18 more generalized forms of political negotiations and identity politics. This would require, for
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20 example, conducting multilevel studies that ask how a decision made at government or legislative
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22 level, e.g., the negotiation of professional boundaries between accountants and lawyers discussed
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24 by Suddaby and Greenwood (2005), is translated in practice and what sort of local boundary work
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26 is necessary to make this happen on the ground. Conversely, studies could also investigate how
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28 the results of micro-strategies pursued at local level are (occasionally) scaled up, spread and
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30 become mainstreamed. A famous historical example here is Rosa Parks’ act of boundary
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32 contestation on a bus in Montgomery, Alabama 1955, a piece of boundary work which was scaled
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34 up and triggered large scale transformations. The challenge here is to pursue these types of studies
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36 holding on to a processual and practice-based sensitivity. This could be achieved by tapping into
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38 recent developments on multisite-ethnography and using the methodological toolkit developed by
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40 studies of nested relationality (Jarzabkowski, Bednarek, & Spee, 2015). Another clear opportunity
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42 for future research is studying boundary work over longer time periods to capture these dynamics.
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44 Our review found several studies that have begun to do this challenging work (Helfen, 2015;
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46 Murray, 2010; Zietsma & Lawrence, 2010), but more would be needed to embed local and specific
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48 episodes of boundary work within the broader societal and historical context.
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3 Conducting studies that connect local boundary work to broader boundary politics could
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5 also pave the way to address the role of affect and emotions in these matters. The issue is
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7 significantly under-recognized in the current literature in spite of evidence that boundary work is
8
9 often emotionally charged. Many of the studies we examined here hint at the fact that boundaries
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11 are often affectively invested and that boundary work stirs emotions. This comes through most
12
13 obviously in studies of embodied boundary work (Azambuja & Islam, 2019; Yagi & Kleinberg,
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15 2011), without necessarily being specifically theorized. This applies even in studies that examine
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17 issues where affect is likely to play an important role, like in Farias' (2017) study of a non-capitalist
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19 community where members are struggling with being embedded in a capitalist system while
20
21 concurrently resisting it. Consequently, our view of boundary work is significantly over-
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23 intellectualized and we know very little about the emotional dimension of boundary work, how
24
25 affect is mobilised and how it is put to work for, at and through boundaries.
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30 31 **Boundary work in practice**

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33 The study of boundary work is important for theoretical but also for practical reasons. The
34
35 pragmatic intent behind the study of boundaries and boundary work is to shed light on the
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37 phenomenon in order to support those who operate in multi-boundary conditions and those who
38
39 design and manage boundary activities. The overarching aim is to provide conceptual tools and
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41 ideas that can enhance collaboration and integration, support the reconfiguration of existing
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43 distinctions and the establishment/ consolidation of some of them as required by local conditions.
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47 In more concrete terms, the current literature already offers some useful practical ideas.
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49 From the competitive boundary work literature, we would suggest that managers need to
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51 understand the highly symbolic importance of boundaries for occupations and other social groups.
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53 The capacity to differentiate ones' group from others in some valued and recognized way seems
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3 to be critically important. The incapacity to achieve some kind of positive distinction is likely to
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5 leave groups demoralized with potentially negative consequences for work performance.
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8 From the collaborative boundary work literature, we note the paradoxical role of boundaries
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10 in enabling coordination on the one hand, but on the other hand, doing so most effectively when
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12 there is flexibility and boundary blurring in the moment to get work done, and when groups are
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14 able to find some commonalities based for example on a shared organizational-level identity
15
16 despite their differences (Orlikowski, 2002). Managers need to understand moreover that while
17
18 boundary distinctions especially among occupational groups are contextualized in situ in every
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20 workplace, they are often ultimately derived from institutionalized distinctions at field level that
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22 may be instilled during professional training, embedded in broader power dynamics, and therefore
23
24 relatively resistant to manipulation.
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29 Nonetheless, the configurational boundary work literature also draws attention to the
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31 potentially powerful role of managerial or entrepreneurial agency in configuring boundaries for
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33 other groups in order to pursue collective goals. Configurational boundary work can create settings
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35 where groups are isolated from others temporarily to seed the possibility change. Boundaries can
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37 also join as well as divide, and if used selectively can contribute to organizational change and
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39 effectiveness. Yet, it is important to understand that boundary work of all kinds is indeed “work”
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41 that is never finally settled. Even when new structures and spaces are created, implemented and
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43 embedded in organizational charts, the boundaries intended to reconfigure patterns of
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45 differentiation and integration in certain ways will be acted upon by other agents in their
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47 competitive boundary work to establish or affirm status and legitimacy, and through collaborative
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49 boundary work to coordinate, collaborate and get work done, despite distinctions.
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3 Indeed, as revealed throughout this review, the notion of boundary work contributes in a
4 broader sense to moving away from a notion of organizations as inert containers for activity
5 towards a more processual understanding related to Weick's (1979) notion of "organizing."
6 Paraphrasing Fournier (2000), to the extent that boundaries in organizations imply "divisions of
7 labor" that serve to channel activity, boundary work can be seen as the "labor of division."
8 Boundary work is thus a central element of organizing and crucially important to understanding
9 how organization emerges and unfolds over time.
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19 Building on this, the notion of "boundary work" offers in fact a particularly interesting
20 concept for the analysis of alternative organizational forms including many that have been enabled
21 by new technologies and that have been called "boundaryless." While most studies of boundary
22 work to date have focused on settings traversed by pre-existing boundaries that people attempt to
23 influence, more interesting perhaps are those settings where boundaries are initially not evident –
24 where things do not appear to fit together. Studies of boundaryless organizations and other new
25 forms of so-called boundaryless organizing such as co-working spaces, supply partner co-location
26 and technology listening posts (Gassmann & Enkel, 2004) could help future managers to refine
27 their skills when conducting configurational boundary work. They could also help to distinguish
28 more finely between the rhetoric and reality of boundaryless organizing.
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42 In sum, the notion of boundary work, with its focus on the continuous and open-ended
43 activities of "doing" boundaries and organizing, is well adapted to provide important insights for
44 managing and organizing in a world where organizational life is increasingly characterized by
45 highly distributed, digitally embedded and fast shifting and organizational configurations and
46 settings, in contrast to views on organizations as codified and stable entities.
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55 Conclusion

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3 The purpose of this review was to (1) clarify the distinctive contribution of the notion of
4 boundary work to organization theory; (2) to distinguish different types of boundary work, their
5 triggers and consequences; and (3) to build on and reach beyond existing scholarship to suggest
6 directions for future research. In terms of the first, we argue, based on this review, that the notion
7 of boundary work offers significant potential for integrating agency, power dynamics, materiality,
8 and temporality into the study of organizing. Traditional lenses for studying organizations focus
9 on structures, made up of well-defined boxes (jobs, units, and hierarchies) filled by people with
10 specific roles and occupations responsible for well-defined problems and issues. But we have
11 known for a long time that the boxes and official channels of the formal organization tell only part
12 of the story (Ranson, Hinings, & Greenwood, 1980). A boundary work perspective offers a
13 different lens on organizing by focusing on how the formal lines that divide and channel activity
14 are at the same time worked for, at and through by the agency of individuals and groups. As we
15 have illustrated, this is sometimes for selfish purposes, sometimes for benevolent ones, and
16 sometimes in an attempt to reshape patterns of bounded activity in more fundamental ways.

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19 In response to the second and third objectives mentioned above, this review synthesizes
20 what scholars who have taken a boundary work perspective in their research have enabled us to
21 see so far in relation to competitive, collaborative and configurational forms of boundary work,
22 and identifies many potential directions for future research. However, beyond the many specific
23 directions mentioned above, we believe that the notion of boundary work has even richer
24 possibilities that have not so far been exploited because many organizational phenomena have
25 simply not been considered explicitly using this lens, although they easily could be. In clearer
26 terms, we think that the main affordance of the notion of boundary work is that it invites us to
27 think about new and old phenomena in a novel way. For example, in the domain of work, scholars

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3 have recently developed the notion of “job-crafting” in which people design their own jobs (Tims
4 & Bakker, 2010). What is this however but “boundary work”? As hinted at by Stjerne and
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6 & Bakker, 2010). What is this however but “boundary work”? As hinted at by Stjerne and
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8 Svejenova (2016), a boundary work lens also seems relevant to project management, because
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10 spatial, social and temporal boundaries are constantly being reworked. Yet little research has
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12 exploited this opportunity either.
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15 Doing a little boundary work of our own, we think that the boundaries for the application
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17 of a boundary work perspective are much more open than usually thought. Boundary work is not
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19 just about professions and occupations, but about boundaries among groups, organizations and
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21 occupations wherever they may be. On the other hand, the notion of boundary work is not a label
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23 for just anything to do with boundaries. It is about process, practice and activity (Langley &
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25 Tsoukas, 2017; Nicolini, Mengis, & Swan, 2012), not about cartography. Specifically, it focuses
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27 on the sayings and doings of purposeful individuals and collectives as they invest in work to
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29 influence the social, symbolic, material or temporal boundaries, demarcations and distinctions
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31 shaping their context and activities.
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Table 1: Three Types of Boundary Work




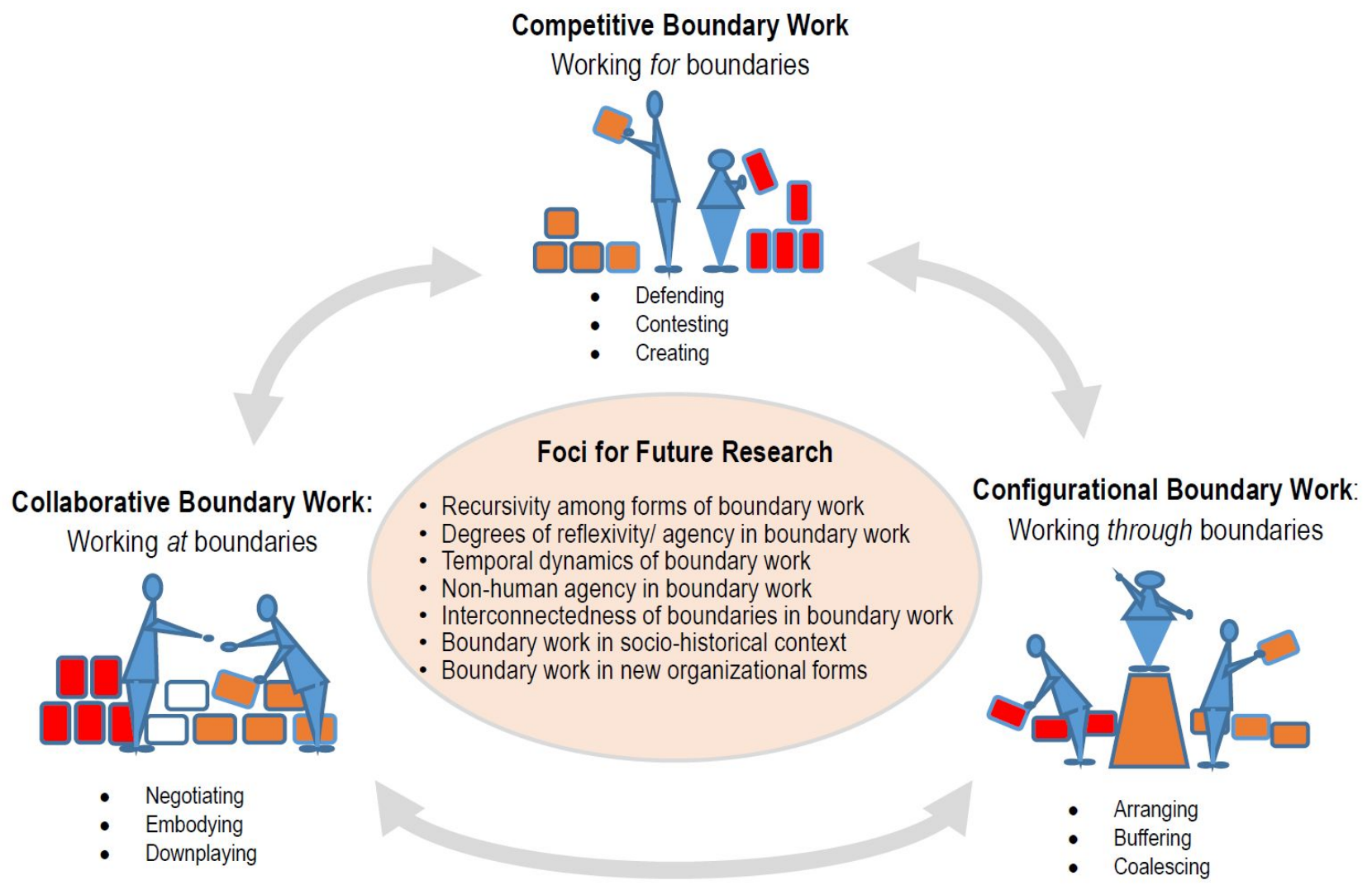
	Competitive Boundary Work	Collaborative Boundary Work	Configurational Boundary Work
Schematic representation			
Agents, positions and purposes	People raising boundaries around themselves to protect territory and exclude others	People realigning the boundaries separating them to enable collaboration	People designing boundaries to orient configurations of differentiation and integration among groups
Historical and theoretical roots	Social studies of science (Gieryn, 1983); Practice theory (Bourdieu, 1977)	Negotiated-order theory (Strauss, 1978); Practice theory (Bourdieu, 1977).	Boundary theories (Lamont & Molnár, 2002); Boundary organizations (Guston, 2001)
Adjacent perspectives	Professions, occupations (Abbott, 1988, 1995)	Boundary spanning (Levina & Vaast, 2005); Boundary objects (Carlile, 2002, 2004)	Framing and spaces from social movement theory (Benford & Snow, 2000)
Modes of boundary work	Working for boundaries: <ul style="list-style-type: none"> • Defending • Contesting • Creating 	Working at boundaries: <ul style="list-style-type: none"> • Negotiating • Embodying • Downplaying 	Working through boundaries: <ul style="list-style-type: none"> • Arranging • Buffering • Coalescing
Consequences of boundary work	Creation, maintenance or disruption of power relations between groups	Collaboration, learning and coordination among different groups	Reconfiguration of patterns of collaboration and competition among groups

Figure 1: Synthesis and Foci for Future Research



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Supplementary Materials for “Boundary Work among Groups, Occupations and Organizations: From Cartography to Process”
Appendix 1: Selected Articles on Competitive Boundary Work

Article	Question/ Focus	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
<i>DEFENDING BOUNDARIES</i>						
Allen (2000)	How do nurse managers do occupational demarcation?	Nurse managers influencing boundaries between doctor/ nurse/ assistant roles in NHS	Field observations and interviews with three occupational groups in a UK hospital	Government policy promoting professional role flexibility	<i>Defending:</i> Taking control, establishing expertise, identity work	Focuses attention on boundary work as a rhetorical and practical accomplishment
Burri (2008)	How is radiological identity and jurisdiction constituted, established and defended?	Radiologists expanding jurisdictional boundaries to include new MRI technology	Interviews with practitioners and field observations (imprecise description)	New technology: magnetic resonance imaging (MRI)	<i>Defending:</i> Physically placing machines, acquiring new skills, symbolic capital	Shows how material, epistemic and symbolic resources are used in boundary work
Ehrich et al. (2008)	How are personal moral views reconciled with professional ethical frameworks?	Geneticists working boundaries between scientist and non-scientists	Observation, interviews (26) and ethics discussion groups with staff from two UK sites	Media debate on destruction of embryos, views and experiences from those in the field	<i>Defending:</i> Avoiding, rationalizing/ distancing, science over personal views	Shows the boundary work of scientists to defend their professional practices
Garud et al (2014)	Why did Climategate occur? Why is climate science still fighting for legitimacy?	Scientists repairing damaged boundaries between science and non-science	Document analysis based on news media and inquiry reports	Crisis following the hacking of computer server of Climatic Research Unit	<i>Defending:</i> Drawing distinctions, boundary repair and potential for boundary bridging	Shows how defensive boundary work can be insufficient after boundary breaching
Gieryn (1983)	How is the demarcation of science accomplished?	Scientists drawing boundaries between science/ non-science	Document analysis of historical texts for three situations	Scientists’ moves to establish legitimacy, achieve monopoly, protect autonomy	<i>Defending:</i> Discursively claiming rigor, objectivity, value vs. non-science	Coins term boundary work; Shows socially constructed nature of categories like science
Hazgui and Gendron (2015)	How did the audit profession respond to the establishment of independent oversight?	Audit profession and new oversight body working out boundaries over regulation	Interviews (33) with auditors and regulatory body members plus document analysis	Government creation of oversight body for audit profession after financial crisis	<i>Defending:</i> Operational and symbolic tactics; resisting, reinterpreting and stabilizing	Shows how boundary work of profession can lead to partial co-optation of regulators
Hobson-West (2012)	How is animal research justified?	Scientists drawing ethical boundaries round use of animals in research as acceptable	Interviews (18) with scientists engaged in animal research in UK universities	Pressures of anti-animal research activists	<i>Defending:</i> Separating humans and animals, following rules, contrast with others	Shows use of boundary work to claim ethical practices vs. unethical and maintain position
Murray (2010)	How can hybrids maintain a distinctive boundary?	The boundary between academic and commercial interest	Interview with 44 informants, document analysis and bibliometric research	The patent of the “oncomouse” designed by geneticists for the study of cancer	<i>Defending:</i> Science trying to defend their practice of open sharing of knowledge	Shows how boundary work may involve coopting tools of opponents for defense
Wainwright et al. (2006)	How do scientists draw the boundaries of ethical scientific activity?	Stem cell scientists drawing boundary between ethical and non-ethical science	Interviews with stem cell scientists in two laboratories(15)	Ethical and public policy debates around stem cell research	<i>Defending:</i> Ethics talk: 3 tactics: embryos are waste, “just cells,” we are following rules	Shows how scientists use ethical boundary to delineate virtuous ethical space

Article	Question/ Focus	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
CONTESTING BOUNDARIES						
Arndt and Bigelow (2005)	How did a female-dominated occupation become masculinized?	Male and females in hospital administration	Document analysis of every issue of Modern Hospital from 1913-20, plus read other journals	Introduction of new jurisdiction for “general manager” and “administrator”	<i>Contesting</i> : Discursive associations making males more appropriate as heads of hospitals	Shows how early boundary work and professionalization was also related to gender
Bach (2012)	How do nurses and health care assistants advance their occupational interests?	Nurses and health care assistants defining boundaries in UK health care system	Two sites, 60 interviews with nurses and health care assistants (HCAs)	Government policy promoting use of less skilled workers (HCAs)	<i>Contesting</i> : Low status group focuses on similarities; high status group on distinctions	Shows how lower status groups do boundary work by blurring distinctions
Bucher et al. (2016)	How do professions respond to proposals for inter-professional collaboration?	Professions drawing jurisdictional boundaries in Canadian health care	Discourse analysis of five position papers by different professional associations	Government policy proposing increased inter-professional collaboration	<i>Contesting</i> : Discursive issue framing, justifying, self-casting, alter-casting	Shows how a profession’s status and centrality influences types of boundary work
Ezzamel & Burns (2005)	What renders certain domains of expertise vulnerable to claims by other groups?	Accountants, and buyers/ merchandisers drawing jurisdictional boundaries	Interviews (34) and document analysis in retail firm	New tool (EVA) to improve business performance	<i>Contesting</i> : Competing discourses about professional superiority based in business tools	Shows how invasive boundary work may backfire as targeted groups respond
Helfen (2015)	How do incumbents and challengers perform in the politics of boundary work?	Field actors long term involvement in legalization of agency work in Germany	Longitudinal, historical study. Document analysis and semi structured interviews	The legalization of agency work	<i>Contesting</i> : incumbents uphold and reinforce while challengers redraw boundaries	Shows how boundary work has implications for fields’ settlement changes over time
Johansson & Lundgren (2015)	How are spatial divides connected to the practice of gender and work?	Managers and employees of a supermarket involved in job rotation program	Ethnographic study. Observation, semi structured interviews and document analysis	The incentives of managers to increase efficiency and work environment	<i>Contesting</i> : Creating gender divides through physical, social, mental boundary intersections	Shows how gender, space and work are mutually enacted
Lefsrud and Meyer (2012)	How do experts attempt to safeguard their expert status against others?	Professionals in the petroleum industry establishing boundaries of expertise	Survey responses of 1077 professional engineers and geoscientists in Alberta	Debates about the Kyoto Protocol and climate science	<i>Contesting</i> : Five discursive frames in terms of identity and construction of others	Shows competitive use of boundary work to claim expertise and dismiss other positions
Persson (2010)	What happens when intersecting relations of gender and occupation are challenged?	Members of armed forces establishing occupational and gender boundaries	Interviews (9) Discursive, with references to practices	Government new “New armed Forces” policy around defense and gender equality	<i>Contesting</i> : Drawing on metaphors to negotiate occupational and gender boundaries	Shows how two foci for boundary work (gender, occupation) are intertwined in practice
Sanders & Harrison (2008)	How do professionals seek to legitimize their roles at times of fluidity?	Four professional groups establishing boundaries of expertise	Interviews with 33 professionals	Government policy suggesting need for multi-disciplinary teams.	<i>Contesting</i> : Claims of expertise, competence and efficiency varying by group	Shows how distinctive boundary work tactics are used between high and low status groups
CREATING BOUNDARIES						
Edlinger (2015)	How do employer branding managers (EBMs) do work and build social position?	EBMs constructing boundaries between legitimate and unauthorized branding	Interviews with 20 EBMs in international firms	Emergence of a new role amid previously unmanaged activities	<i>Creating</i> : Practices of creating, controlling, promoting, protecting, policing ideal brand	Shows how new occupational groups do boundary work to establish their niche

Article	Question/ Focus	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
Ashuri & Bar-Ilan (2016)	How do organizations filter participants in a flat organization?	Organization members drawing boundaries between desirable and undesirable participants	Interviews with strugglers and activists in housing non-profit	Need to attract participants but exclude undesirable members	<i>Creating</i> : Validating honesty, social awareness and commitment via social network tools	Shows how social network tools enable boundary work in flat organizations
Farias (2017)	How is an alternative culture of exchange negotiated in day-to-day interaction?	Members of non-capitalist organization establishing boundaries with capitalist society	Participant observation (49 days), interviews (20), documents in an intentional community	Symbolic threat of money to non-capitalist organizational form	<i>Creating</i> : Distancing and re-appropriating practices where new meanings given	Shows unstable and porous dynamics of boundary work in alternative settings
Greenman (2012)	How do owner-founders of cultural businesses account for venture creation?	Founders drawing on occupational boundary elements to frame their ventures	Participant observation, interviews (16) in a cultural design community	New venture creation by design professionals	<i>Creating</i> : Use of occupational frames to legitimize ventures and develop commitment	Shows how occupational boundary work frames/ orients entrepreneurial activity
Mikes (2011)	Are the practices of risk management in banks expansive and dysfunctional?	Risk managers drawing boundaries between their activities and other departments	Interviews (75) in two banks, with follow-up interviews (53) in 5 other institutions	Emergence of a new role under societal pressure	<i>Creating</i> : Two modes of boundary work: risk control vs. envisioning (more porous)	Shows how more open boundary work can allow greater influence than rigid closing down
Santos and Eisenhardt (2009)	How do entrepreneurs shape organizational boundaries and construct markets?	New ventures setting boundaries between their organizations and the environment	Analysis of archival data and interviews (46) for five new ventures in tech sector	Entrepreneurs identifying opportunities	<i>Creating</i> : Sensegiving, cooptation and ownership strategies to dominate market	Shows how boundary work strategies are used to acquire power and dominate others
ADJACENT LITERATURE (examples not referring explicitly to the term “boundary work” but discussing similar issues)						
Martin et al. (2009)	How are intra-professional boundaries renegotiated following a reform initiative?	Geneticists and generalists establishing boundaries between jurisdictions	Four case studies of pilot sites. 24 interviews with	Government policy introducing new qualification for generalists	<i>Defending</i> : Geneticists emphasize need for diffuse knowledge for professional judgement	Shows how powerful groups maintain their domination in their boundary work
Suddaby & Greenwood (2005)	How are symbolic resources used to persuade actors of institutional change?	Accountants and lawyers debating boundaries between the professions	Documents from two commissions on multi-disciplinary practices	Accounting firms' move to create multi-disciplinary practices that include law	<i>Contesting</i> : Proponents use pragmatic arguments; Opponents use moral arguments	Shows how positioning vs. a proposed change influences boundary work tactics
Bechky (2003a)	How are occupational jurisdictions enacted in the workplace?	Engineers, technicians, assemblers establishing jurisdictions in product development	One year ethnography in semi-conductor manufacturing company	Everyday work of engineering design, and machine manufacturing	<i>Contesting</i> : Drawings and machines enact knowledge, authority legitimacy boundaries	Shows how use of material artifacts enacts status boundaries among occupations
Huisig (2014)	How can organizations wrest control from experts?	Organizations pushing back boundaries with experts to increase control	Two year ethnography in research laboratories including 61 interviews and documents	EPA rules to improve safety in research laboratories	<i>Contesting</i> : Incumbent groups ignore; Challengers build alliances for change	Shows how collective boundary work of low power groups may change the balance
Reay et al. (2006)	How do individual actors institute change in established ways of working?	Nurse practitioners in Alberta establishing role boundaries with physicians	Observation of meetings (25), Interviews (33) and documents	Emergence of new professional group: nurse practitioners	<i>Creating</i> : Cultivating opportunities, Fitting role to existing systems, Proving value	Shows practices of pushing back boundaries through small wins over time

Appendix 2: Selected Articles on Collaborative Boundary Work

Article	Research question	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
<i>NEGOTIATING BOUNDARIES</i>						
Allen (1997)	How do social orders emerge between doctors and nurses in the workplace?	Health care professionals negotiating boundaries in everyday work	Ethnography, observations of work, 57 interviews	Everyday work of patient care	<i>Negotiating:</i> Boundary blurring oriented to continuity, articulating, judgmental, rule, lay	Shows boundary blurring work done by lower status group to enable work to go on
Apesoa-Varano (2013)	How do health care practitioners coordinate roles in light of expertise hierarchy?	Five occupational groups negotiating boundaries at the bedside of the patient	3-year ethnography study of urban teaching hospital in the US; 110 interviews	Everyday work of patient care	<i>Negotiating:</i> Doing others' work; transgressing diagnostic lines; dismissing others	Shows ironic duality of boundary work: boundaries crossed and reinforced at same time
Barrett (2012)	How does technology affect work, interests and relations of occupational groups?	Three occupational groups working at boundaries around pharmacy robot	Ethnography in two hospital pharmacies; 20 hours observation; 41 interviews	New technology requiring new collaborative practices	<i>Negotiating:</i> Boundary cooperation, boundary neglect, boundary strain	Shows how materiality reshapes boundary work for multiple interacting groups
Haland (2012)	How does the electronic patient record affect occupational boundaries?	Occupational groups renegotiating boundaries after EPR implementation	18 interviews with doctors, nurses, physiotherapists and office staff	Introduction of EPR in a hospital	<i>Negotiating:</i> Transferring work from nurses to doctors, resistance to transfer	Shows how technology affects boundary work of different groups
Liberati (2017)	How does the negotiation context affect occupational boundary negotiation?	Nurses and doctors in three different health care settings	Ethnography involving 225 observations of nurse doctor interactions in three settings	Everyday work of patient care	<i>Negotiating:</i> Three ways of constructing boundaries: separating, replacing, intersecting	Shows how the negotiation context affects collaborative boundary work
Lindberg et al. (2017)	How is boundary work performed in practice when technology changes interactions?	Nurses negotiating new boundaries following implementation of new technology	Observation of meetings, shadowing, 42 interviews in new hybrid operating room	Implementation of new technology requiring collaboration between surgery and radiology	<i>Negotiating:</i> Reinforcing, spanning, breaching, blurring boundaries for renewal	Shows collaborative boundary work around technology as emerging actor-network
Patriotta and Spedale (2011)	How does face-to-face interaction in meetings structure boundaries for decision making?	Groups endogenously negotiating boundaries in decision making meetings	5 month participant observation of a consultancy task force in an oil field project	Meetings involving representatives of organizations with different interests	<i>Negotiating:</i> Framing situation, controlling flow, micro-repairs	Shows role of face-to-face interaction in the forming boundaries within group meetings
Quick and Feldman (2014)	How do public managers' boundary work practices promote resilience?	Urban planners, residents and other relevant groups aligning boundaries	Illustrations from a midsized US city, based on ethnographic research	Collaborative city planning and management projects	<i>Negotiating:</i> Translating, aligning, decentering differences	Shows boundary work as creating junctures rather than separation, promoting resilience
Rodriquez (2015)	How do professionals use rhetoric and practice of teamwork in relation to families?	ICU team negotiating boundaries between families and team	18-month ethnography in Unit of US hospital: 300hr observations, 35 interviews.	Initiative to include family members' participation in the ICU Team	<i>Negotiating:</i> Integrating or, narrowing families' role at different times	Shows how boundaries with families are re-established to enable professional work
Sage et al. (2016)	What role do animals play in human-animal boundary work in construction projects?	Human-animal boundaries negotiated in building projects,	2 case studies of construction projects in UK and Scandinavia (unclear data)	Presence of an unexpected and unruly elements (animals) on building sites	<i>Negotiating:</i> Excluding and inviting animals; Animals disturbing humans	Shows relationality of human and animal boundary work and role of space and time

Article	Research question	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
EMBODYING BOUNDARIES						
Azambuja and Islam (2018)	How are tensions ensuing from boundary work experienced by middle managers?	Middle managers working at the boundaries between parts of organizations	7 months ethnography in four offices of a Brazilian accounting firm	Everyday work of middle managers	<i>Embodying</i> : Acting as boundary subjects experiencing emancipation and alienation	Showing the ambivalent nature of the work of boundary subjects
Boon (2007)	How do housekeeping employees negotiate boundaries in hotel guest rooms?	Housekeeping staff occupying boundary space between front-of and back-of-house	Interviews with 67 hotel employees in 7 accommodation hotels in New Zealand	Service encounters between housekeeping employees and hotel guests	<i>Embodying</i> : translating FOH objects into BOH space, integrating self into FOH situations	Shows boundary work as ambiguous movement between physical spaces
Ellis and Ybema (2010)	How do alliance (IOR) managers position themselves and their firms vis-a-vis others?	IOR managers working boundaries with suppliers, competitors, colleagues, customers	13 one-hour-long interviews with IOR managers	Everyday work of IOR managers	<i>Embodying</i> : Discursive shifting between inclusion and exclusion vs different boundaries	Shows fluid use of boundary repertoires to expand and contract identification circles
Soundararajan et al. (2018)	How do sourcing agents bridge buyers and suppliers in global supply chains?	Sourcing agents at boundaries of power, language and culture for buyers and suppliers	34 interviews with sourcing agents, suppliers and others in Indian garment industry	Everyday work of sourcing agents	<i>Embodying</i> : Reinforcing, flexing and restoring boundaries to allow accommodation	Shows boundary work of boundary-spanners-in practice across different languages and cultures
Yagi and Kleinberg (2011)	How do bi-cultural people manage inbetweenness in multinational contexts?	Global organizations' members dealing with boundaries in their day-to-day job	7 months ethnographic fieldwork at a US-Japan technology company	Everyday work of Japanese members of the US subsidiary	<i>Embodying</i> : Acting as pipes, conduits resolving problems, being cultural insiders	Shows role of cultural knowledge in performing complex boundary work
DOWNPLAYING BOUNDARIES						
Meier (2015)	How do health care practitioners collaborate across boundaries?	Health professionals interacting across occupational boundaries	Ethnography; 26 interviews, 115 hours of observation in two hospital wards	Everyday work during implementation of clinical pathway	<i>Downplaying</i> : Dissolving boundaries around "we;" Patients as boundary objects	Shows how boundary work may contribute positively to collaboration
Pouthier (2017)	What is the role of griping and joking in cross-boundary teams?	Multiple occupations interacting across boundaries during meetings	Observation of 50 meetings, 22 interviews, palliative care unit in hospital	Everyday multi-occupational team work	<i>Downplaying</i> : Griping rituals to share, joking rituals to mask boundaries	Shows use of griping and joking as forms of boundary work easing occupational tensions
Ybema et al. (2012)	What discursive strategies do staff use in positioning vs. international counterparts?	Dutch staff negotiating boundaries with "Southern" partners in everyday work	Ethnography of human rights organization; 390 hrs of observation, 11 interviews	Discourse of Northern NGO members talking about relations with Southern partners	<i>Downplaying</i> : Boundary effacing talk, othering self, levelling out hierarchy, using we	Shows collaborative boundary work through deconstruction of differences
ADJACENT LITERATURE (examples not referring explicitly to the term "boundary work" but discussing similar issues)						
Bechky (2006)	How is coordination achieved in temporary organizations?	Occupational groups negotiating roles (and role boundaries) on a film set.	Ethnographic study of four film sets; participant observation; interviews	Creation of temporary projects for film production	<i>Negotiating</i> : Role boundaries are enacted through thanking, admonishing, joking.	Shows how boundary work emerges in situ through discursive means
Kellogg et al. (2006)	How do actors coordinate across boundaries in fast moving settings?	Four organizational communities negotiating across knowledge boundaries	Single case Adweb, 100 interviews; observations of project meetings; documents	Everyday fast-paced coordination around client projects	<i>Negotiating</i> : Displaying work; Representing work; Assembling	Shows collaborative boundary work as a "trading zone" imbued with boundary tensions

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Article	Research question	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
Kaplan et al (2017)	How are cognitive and political boundaries spanned simultaneously?	Biologists, chemists and students working across interdisciplinary boundaries	Ethnography (9 months) in Nano-center, 22 interviews	Research projects	<i>Embodying</i> : Students serve as symbionts learning technology and bridging domains	Shows how boundary spanners and boundary objects may be fused in boundary work
Levina & Vaast (2005)	How does boundary spanning competence emerge in practice?	Groups interacting across organizational unit and organizational boundaries	Two case studies of IT projects: observation (13 months); Interviews (72)	IT project development	<i>Embodying</i> : Becoming a legitimate peripheral participant; legitimate negotiator; motivation	Shows how people acquire competence as collaborative boundary workers-in-practice
DiBenigno & Kellogg (2017)	How do demographic differences/ similarities affect cross-boundary relations?	Nurses and patient care technicians collaborating across occupation boundaries	Ethnography of two surgical units; 42 observations and interviews	Everyday work on two units	<i>Downplaying</i> : Shared cross-cutting demographics enables decentering difference	Shows how demographic boundary work intersects with occupational work
Majchrzak et al. (2012)	What practices do diverse teams use to integrate knowledge in situations of novelty?	Cross-functional team members working across knowledge boundaries	Video-recorded team meetings, multiple interviews with members, documents	Teams facing novel situations with time-bounded tasks	<i>Downplaying</i> : Voicing fragments, co-creating, and dropping scaffold, sustaining engagement	Shows how teams work to transcend boundaries in co-creation
Orlikowski (2002)	How to distribute organizing for product development across multiple boundaries?	People in product development units working across seven types of boundaries	Case study of five product development units in one firm; 78 interviews, other data	Product development projects	<i>Downplaying</i> : sharing identity, interacting, aligning, learning, participating	Shows collaborative boundary work to occur as a form of knowing in practice

Appendix 3: Selected Articles on Configurational Boundary Work

Article	Research question	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
ARRANGING BOUNDARIES						
Cartel et al. (2018)	How can experimental spaces provoke innovations in institutional fields?	Field actors involved in and affected by the European field of climate regulation	Longitudinal case study using document analysis and 28 semi structured interviews	Mobilizing support to endorse a European carbon market among affected field actors	<i>Arranging</i> : Creating space for innovation through social and symbolic boundaries	Shows how boundary work, distancing work and anchoring work stimulate innovation
Bucher & Langley (2016)	How do “spaces” as bounded social settings enable the reorientation of routine dynamics?	Managers arranging temporary boundaries of social settings to enable routine change	Longitudinal studies of patient care routines in 2 hospitals, interviews (52), observations	Initiatives by chief surgeons to improve patient care routines	<i>Arranging</i> : Creating experimental and reflective spaces to orient interactions	Shows how managers do boundary work to create spaces enabling routine change
Cross et al. (2000)	In changing to team-based structure, how do boundary activities migrate or re-emerge?	Managers doing boundary work in and across work units after structural change	Observations and interviews during 4-month implementation of new structure	Change from functional to team structure	<i>Arranging</i> : Boundary work intensifies and involves lower levels after structural change	Shows how managerial boundary work shifts focus following structural change
Oldenhof et. al. (2016)	How do middle managers create inter-organizational change with boundary work?	Managers redrawing boundaries among service providers in Dutch healthcare	Observation of an organizational change. Shadowing of 4 managers	Political initiatives to implement a public reform	<i>Arranging</i> : Boundary-transcending vocabulary; creating new spaces of collaboration	Shows boundary work of reshuffling spaces for interaction and accountability
Sandal and Svejenova (2016)	How are temporary organizations separated or integrated from the host organization?	Film company managing temporal, role, project and genre boundaries	Longitudinal studies of 3 movie projects; 30 interviews, observation of one project	Aim to balance innovation and persistence in three film projects	<i>Arranging</i> : Boundary work around roles, projects, genres, temporalities	Shows how permanent organizations manage boundaries to resolve project tensions
Zietsma, & Lawrence (2010)	How does boundary work contribute to produce stability and change within a field?	Field actors reshuffling the boundaries in the British Columbia forest industry	Longitudinal study of field practices in forestry industry; 69 interviews	Conflict about the established forest harvesting practices	<i>Arranging</i> : Boundary breaching, bolstering, connecting, creating spaces for innovation	Shows how field actors’ boundary work enables innovation in experimental spaces
BUFFERING BOUNDARIES						
Caine (2016)	How do boundary organizations facilitate knowledge transfer for scientific and politics?	NGO facilitating relations between first nations and government	Two longitudinal case studies, participant observation and interviews	Need to support multi-stakeholder collaboration	<i>Buffering</i> : Mediating through boundary objects (stories, plans), people	Shows how boundary organizations mediate between disparate interest groups
Guston (1999)	How do boundary organizations transfer knowledge across domains?	Technology transfer offices facilitating transfer from research to practice.	Longitudinal, historical case study based on document analysis	Need to evaluate the productivity of publicly funded research	<i>Buffering</i> : Creating spaces for a combined social order and/or boundary objects	Shows how boundary organizations do boundary work across social worlds
Mørk et. al. (2012)	What role do boundary organizing practices play in developing a new medical practice?	New R&D department creating a space for interaction across composite boundaries	Longitudinal analysis, observation, 38 interviews and document analysis	Physicians aiming to transform scientific breakthroughs into practice	<i>Buffering</i> : Creating spaces to combine procedures from different communities	Shows how boundary organizing occurs within new organization

Article	Research question	Agents/ Boundaries	Methodology	Triggers	Modes	Contribution
O'Mahony & Bechky (2008)	How can challengers and defenders work together but maintain divergent interests?	Open source communities and firms operating a boundary organization (BO)	Ethnographic study of 4 open-source projects. 24 observations, 70 interviews, documents	The incentive of two incompatible organizations to achieve a common goal	<i>Buffering</i> : BOs offer pluralistic control, enable voice, do brokering, hold assets	Shows how boundary organizations enable common interests, but preserve divergence
COALESCING BOUNDARIES						
Frickel (2004)	How are “inter-disciplines” (at the intersection of scientific fields) made?	Genetic toxicologists establishing porous boundaries amidst existing disciplines	Document analysis (1910-1976), event observations (4), and interviews (27)	Emergence of threat of exposure to synthetic chemical mutagens	<i>Coalescing</i> : Discursive frame amplification, frame extension and frame translation	Shows boundary work used for perforating boundaries, or creating new porous boundaries
Granquist and Laurila (2011)	How do new scientific fields emerge? What role do peripheral movements play?	Futurists and scientists forming boundaries round the definition of nanotechnology	Interviews (16) and document analysis (1986-2005) of nano-technology field	Emergence of popular futurist movement related to science	<i>Coalescing</i> . Futurist, fictional and scientific framings converging and diverging	Shows how boundary work may first draw on peripheral framings and then reject them
Liao (2016)	How is augmented reality defined as scientific field?	Scientists are creating a boundary in relation to other scientists and business interests	Longitudinal fieldwork using participant observation and interviews	The wish to separate augmented reality from virtual reality as a research field	<i>Coalescing</i> : Defining to expand authority, claim a new space and negotiate membership	Shows how a definition (symbolic boundary work) is part of creating a new field
Llewellyn (1998)	What is the role of boundary work in the integration of cost and care in social service?	Managers coalescing the boundaries of cost and care in social services	Interviews with 26 social service staff involved in reform at two points in time	Managerial initiative to increase cost efficiency of social services	<i>Coalescing</i> : Gradual mingling of cost and care boundaries via people, budgets, etc.	Shows boundary work involved in merging previously distinct domains of activity
Suddaby et al. (2015)	How do changes in professional expertise occur?	Accounting firms establishing boundaries with and through social media experts	Longitudinal case; Social media data; Interviews (5) with social media managers	Adoption of new social media	<i>Coalescing</i> : Profession colludes with new experts to alter identity collaboratively	Shows boundary work may not be defensive but can alter domains in gradual shifts
ADJACENT LITERATURE (examples not referring explicitly to the term “boundary work” but discussing similar issues)						
Perkmann & Schildt (2016)	What characteristics enable open data collaboration between academia and firms?	Firms and academia mediating boundaries through an open data platform	16 meetings and 26 interviews members of Structural Genomics Consortium	Emergence of consortium as boundary organization	<i>Buffering</i> : Boundary organizations work by mediated revealing, & enabling multiple goals	Shows how boundary organizations mediate boundaries between academia and firms
Grodal (2018)	How do communities shape social and symbolic boundaries?	Five communities shaping boundaries of nanotechnology field	Observation at 26 conferences; 85 interviews; archival data; 2002-2016	Emergence of nanotechnology field	<i>Coalescing</i> : Creating, expanding, contesting, contracting symbolic and social boundaries	Shows the recursive relationship between symbolic and social boundary work
Howard-Grenville et al. (2017)	How do occupation members initiate and sustain a change in how peers do work?	Chemists constructing the boundaries of the practice of “green chemistry”	Interviews (46), Observations of conferences, Archival data	Advocates within chemistry pushing for consideration of health impacts	<i>Coalescing</i> : Framing by normalizing, moralizing, pragmatizing frames	Shows how tensions between tightening and versatile boundary work sustains field

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