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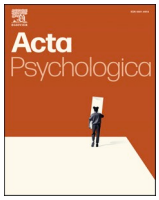

"Never mind the fine print": The interaction of semantics with attitude strength beliefs on corporate cover-ups

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ABSTRACT

This study examined the interaction between attitude strength and the cognitive constraints imposed by the semantic properties of measurement items. It made use of digital algorithms and built on the semantic theory of survey response (STSR), examining how people who hold strong beliefs about contemporary issues violate cognitive constraints in expressing strong attitudes. We examined the beliefs people hold concerning attempts to hide, or cover up, information about organisational scandals. Beliefs in cover-ups are related to beliefs in conspiracy theories in that they tend to overrate cues of wrongdoing, disregarding information that may render a more nuanced picture of events. We obtained responses from 405 people who rated their self-images and personal strengths, and explored how these variables influenced the respondents' beliefs in corporate cover-ups. Using latent semantic analysis (LSA), we differentiated between attitude strength and cognitive processing of the survey items. Results indicated that people with inflated self-images tended to override cognitive cues in endorsing extreme types of cover-ups such as removing accusers. Conversely, people who parse the information more carefully had a more tempered view on cover-ups and were more inclined to believe in subtle forms such as twisting stories.

1. Introduction

The present study is an attempt at using digital text algorithms to disentangle cognitive processing from attitude strength in responses to survey items. Recent research on the semantic properties of survey statistics using a text algorithm has given rise to the so-called "*semantic theory of survey response*" (STSR). Opening a new window to the psycholinguistic processes involved in survey responses, this theory has shown how survey statistics are largely predictable, a-priori, due to the semantic properties of survey items, now computable through digital text algorithms (Arnulf et al., 2014, 2021; Larsen & Bong, 2016). One interesting feature of this new technology is that the cognitive processing of survey items can be computed on an individual level allowing exploration of the interaction between attitude strength and the cognitive parsing of the item texts (Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018). This interaction is particularly interesting to understand belief systems involving strong attitudes that may shape world perceptions, and where the belief systems themselves may seem robust against nuancing information in the environment, such as in conspiracy theories.

There is a rapidly growing literature on conspiracy theories (CTs) (Barron et al., 2014; Brotherton & French, 2014; Douglas et al., 2016; Imhoff & Lamberty, 2017; Van Prooijen et al., 2015). There are excellent reviews of the recent literature (Butter & Knight, 2020; Douglas et al., 2019). CTs usually insist that the causes of many major events are due to a "secret plot" by multiple, evil people often with a selfish, devious, political goals (Sunstein & Vermeule, 2009). This study focused on beliefs about how conspiracies and wrong-doings are subsequently covered up. It has two distinct aims: the first is examine correlates of cover-ups; the second is to explore attitude strength and acuity with respect to cover-ups (CU).

Conspiracist beliefs supposedly serve a psychological function for people who feel powerless, excluded or disadvantaged (Furnham & Grover, 2021; Green et al., 2022; Sullivan et al., 2010; Sunstein & Vermeule, 2009; Uscinski & Parent, 2014; Walter & Drochon, 2020). Studies have focused on individual difference correlates of CTs including ability, ideology, and personality (Douglas et al., 2016; Galliford & Furnham, 2017; Sutton & Douglas, 2020). The assessment of CTs usually involves people noting their agreement with well-known theories about particular events. For instance, the *Belief in Conspiracy Theories* (BCTI,

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Swami et al., 2011; Swami & Furnham, 2012) is a 15-item measure that describes a range of internationally popular conspiracy theories.

One core feature of conspiracy theories is the feature that they are somehow recalcitrant in the face of contrary empirical or logical evidence. It is therefore interesting to investigate whether the tendency to endorse conspiracy theories are related to evidence of cognition that overrides available evidence. Previous studies have shown that there are "cognitive oddities" related to conspiracy studies that are akin to similar cognitive characteristics of schizotypal thinking (Arnulf et al., 2022). CTs researchers argue that some people misattribute agency and intentionality to others where it is clearly inappropriate to do so (Douglas et al., 2016).

Douglas and Leite (2017) noted that believing in conspiracy theories is not random. Instead, they appear to be driven by motives such as understanding, being safe and in control of one's environment, and maintaining a positive image of the self and one's personal social group. Thinking that serves the purpose of controlling one's social role might easily fall victim to "cognitive shortcuts" such as for example overconfidence and confirmation bias, along with a neglect of more nuanced information. This way of depicting the relationship between attitudinal emotions and verbal reasoning is similar to the argumentative theory of reasoning put forth by Mercier and Sperber (2011). They argue that confirmation bias is an expected result of the way reasoning works: essentially as an instrument of persuasion, rather as much as of analysis. Strong beliefs in conspiracies and cover-ups are likely to show signs of cognitive distortion in the service of protecting the social identity of the subject.

Douglas and Leite (2017) and Douglas et al. (2019) argued that research is needed to determine for whom, and under what conditions, conspiracy theories may satisfy key psychological motives (Bowes et al., 2021). This study sought to explore the interplay of attitude strength and self-cognition in the way subjects express their beliefs in cover-ups, a hitherto neglected research area, aiming to illuminate how and why strong attitudes tend to override cognitive constraints on information parsing.

2. Cover ups and conspiracy

Nearly all researchers in this area have attempted to identify particular CTs and then explain who, why and when people believe in them. Furnham and Horne (2022) noted that CT researchers tend to take the perspective of the skeptic or cynic, rejecting CTs as "misguided myths" that fulfill various psychological functions in those who (mistakenly and naively) hold them. However, it is true that there exist many "cover-ups" of events and that some CTs have been exposed as, at least partially, a true account of events. It is clear that many individuals and organizations try to cover-up misdemeanors from tax avoidance and sexual misconduct, to misleading and inaccurate advertising as well as illegal employment practices.

So far it appears that the rapidly expanding CT literature has focused more on the content of CT (classically the death of famous people etc.) rather than the response of groups who have committed some serious misdemeanors. Few, if any researchers in this area, take the perspective of the CT advocates and theorists themselves. The CT perspective is that it is the conspiracy theorists who are themselves insightful into the *cover-ups* (CU) which are occurring: it is the CTs who know the facts not those who scorn them for ignorance and perpetrating myths.

There is however a very limited amount of research in the cover-up field. Nyhan et al. (2016) found conspiracy beliefs to be higher when people were exposed to seemingly redacted documents compared to when they were exposed to unredacted documents. That is, they believed in cover-ups when they say more evidence of them.

In a more salient study Furnham and Horne (2022) explored the demographic, ideological and work-related beliefs, as well as cover up theories in a group of working adults. In their cover-up measure they had items like: "It is naïve to believe the official version of events"; "Our government is a Machiavellian manipulators of the media"; "Most government narratives aim to keep people ignorant and in fear"; "Anti Conspiracy Theorists demonize them and won't take the time and trouble to look at the evidence." The study showed that while demographic and political characteristics were related to beliefs in cover-ups, a major driving factor of these beliefs was a sense of disenchantment and disenfranchisement at work. It therefore seems reasonable to hypothesize that an agentic self is related to the expectations for the types and scope of cover-ups in society.

The object of the present study was to explore whether beliefs in cover-ups may be related to people's self-image in ways that lead to cognitive shortcuts. Specifically, we wanted to see if self-image is related to how probable it is that conspiracies and other types of organized wrongdoing is believed to be concealed in society. To our knowledge, we are the first researchers in the CT literature to link self-image with strong attitudes that overrides cognitive processing, specifically CUs. The way we approached this was to compare people's attitude strength with the cognitive characteristics of their responses, as will be explained in the next section.

3. Attitude strength and cognitive acuity

Traditional Likert-scale studies usually collect people's responses in order to calculate their attitude strength – e.g., the degree to which people agree or disagree with a statement. Responses are largely treated as quantities indicating strength of the measured variable. This implies that a person giving a high score on an item specifically asking about the likelihood of cover-ups is interpreted as believing that such cover-ups are more likely than people responding with lower scores (Michell, 1994).

Recently a different way of analyzing Likert-scale responses has been made available. Through the use of digital text algorithms, it is possible to calculate the degree to which people respond as the *semantics of the surveys* would expect them to (Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018). This is not a matter of attitude strength itself, but a question of how carefully and systematically the respondents read, parse and respond to the actual text (items). Such processes are indicators of what may be called the "cognitive acuity" of the respondents (Arnulf et al., 2020). Responses that deviate from such semantically expected patterns may occur for a number of reasons, for example sloppy reading and wholistic response-sets. However, it has also been shown that strong attitudes may create responses that violate the cognitive structures that would normally shape people's response patterns (Arnulf & Larsen, 2020, 2021; Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018).

For example, someone who agrees with the statement "Today is Friday" should, semantically, also agree to the statement "Tomorrow is Saturday". Responses that disagree with these premises would indicate that something is making the respondent override the cognitive constraints of the surveys structure. Most measurement scales composed of survey items display such semantic structures and, in many cases, allow the prediction of the response patterns a priori (Arnulf et al., 2014; Martinsen, Arnulf, & Larsen, 2016; Nimon et al., 2016). While most semantic structures are not as clear-cut as the example of weekdays above, there is a tendency for groups of items to at least have similar meanings. Previous research shows that most people are cognitively sensitive to these semantic patterns: indeed, it is a prerequisite for understanding the questions of the survey. However, it has also been shown that individuals and groups may deviate from the expected response patterns in ways that reflect other characteristics of these particular respondents. A study by Arnulf et al. (2020) found that social status, education and income biased the semantic response patterns in predictable ways. It seemed that groups of respondents interpret the items differently, thereby twisting the purported meaning of the items. Thus, responses to survey items may be explored for two distinctly different qualities – one, the strength of attitudinal response to a

statement, and secondly, the cognitively determined coherence in response patterns (Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018).

The technique will be described in more detail in the methods section, but the relationship between the two qualities can best be understood as follows: Regarding attitude strength, two respondents are taken to be very different if one of them scores 4 and 5, whereas another scores 1 and 2 on the same two items. The first respondent shows a strong endorsement, the second indicates a different position on that statement. However, both respondents score the two items with a one-point difference (4 and 5, vs 1 and 2, respectively). If the two items are similar in meaning – for example, indicating two close facets of the same belief – the two respondents express different beliefs, but are in agreement about the cognitive difference between the two options, as predicted by the unfolding theory (Kyngdon, 2006; Michell, 1994).

In the present study, we used these two aspects – attitude strength and cognitive acuity – to differentially explore whether believers in cover-ups display cognitive oddities similar to what has earlier been found in supporters of conspiracy theories (Arnulf et al., 2022). In this study, we focused on *how* people believe that organizations go about covering up events that have been illegal, immoral or reputationally damaging.

Based on the reviewed extant literature we argued that beliefs in corporate cover-ups will be linked to people's self-images, in the sense that their vulnerabilities are the basis for perceived wrongdoing in the external world. In this sense, the design collecting "self-report" responses is precisely what we are looking for. We had two specific hypotheses:

H1. There will be significant positive correlations between beliefs in the prevalence of corporate cover-up activities and deviation from the cognitive structure of the survey questions.

H2. The tendency to override the cognitive constraints of the survey will be significantly correlated with self-reported characteristics. That is, people who are more likely to endorse CUs have a more inflated self-image.

4. Method

4.1. Participants

A total of 405 participants completed the questionnaire: 202 were men and 203 were women. They ranged in age from 18 to 67 years, with a mean age of 38.93 years (*SD* = 11.11 years). All had secondary school education and 55 % were graduates. In total 24.8 % were single and 48.1 % married/co-habiting, and 48 % had no children. They also rated 4 personal features on a 0–100 point scale: *Physical attractiveness* (mean: 53.25, SD: 18.68) *physical health*, (mean: 62.10, SD: 21.69), *intelligence* (IQ, mean: 68.96, SD 14.35), and *emotional intelligence* (EQ, mean: 68.46, SD: 18.30) which have been found to form a consistent measure of self-esteem (alpha: 0.72) (Furnham & Sherman, 2022).

4.1.1. Questionnaires

4.1.1.1. Cover ups. This was designed for this study. Items were derived from the "Cover-up" entry in Wikipedia, and then piloted on a small group. The questionnaire had the following instructions:

> "Businesses, governments and religious organizations often attempt to cover-up wrong-doings of many types. Essentially, they try to hide or conceal evidence of error, incompetence, corruption and even crimes. This questionnaire is about your beliefs about cover-ups. Below is a list of common responses to allegations that organizations want to cover-up like taking bribes, sexual misconduct, and mis-selling. For instance, a number of car manufacturers lied about their pollution and emissions, in a scandal that is now known as diesel gate. We want you to rate each response by how common (frequently/regularly) you believe that is what many big organizations do when faced with a serious claim that they have done some wrong/illegal How Common: very Common 9 8 7 6 5 4 3 2 1 very Rare"

The items are shown in Table 3.

4.1.1.2. Self-rated character strengths (Furnham & Lester, 2012). This involved participants rating character strengths on an IQ based normal, bell-curve distribution with a mean of 100 and a standard deviation of 15 points. There were 24 of these, each with a brief description/explanation. Pilot work showed that participants had no difficulty with rating each strength on that scale.

4.1.2. Procedure

Departmental ethical approval was gained prior to data collection. Data was collected on Prolific and participants were compensated for their time at the set rate.

4.1.3. Analytic strategy

The main methodological tool of this study is a comparison between the semantic structure of our questionnaire and the actual response sets produced by the respondents. This approach has been thoroughly described in a recent methodological publication (Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018). We do this by working from two similar but importantly different matrices: The first matrix is the usual item-response matrix, computed as the correlations of all items with all other items. The second is the semantic similarity matrix. This matrix is structurally similar to the response matrix but does not contain any information about human responses. Instead, this matrix is created by entering all survey items into a digital text algorithm called *Latent Semantic Analysis* (LSA). The output is a numerical estimate of the overlap of meaning between any two items in the survey.

We entered all the survey items (except for non-semantic items like age, sex and years of education) into the publicly available LSA engine at lsa.colorado.edu, using a document-to-document procedure and using the *Touchstone Applied Sciences* (TASA) semantic space. This yields a matrix of (45*44)/2 = 990 unique item pairs. The result of this procedure will henceforth be referred to as the semantic matrix of our survey.

Numbers computed in this way are not correlations, but their metric is similar: They are cosines ranging from 0 to 1 indicating how closely the items resemble each other in a semantic space (Dennis et al., 2013; Landauer, 2007). This method can be used to estimate characteristics of human responses: Two items that have similar meaning will most likely elicit similar responses. Conversely, the condition for different responses to two different items is that they have differences in meaning. Together, these two conditions have made it possible to estimate likely patterns of correlations across a wide range of studies (e.g., Arnulf et al., 2014; Arnulf & Larsen, 2020; Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018; Gefen et al., 2020; Rosenbusch et al., 2020).

It is possible to use this set of principles to obtain numbers of how individual respondents are complying with the semantic structures of the survey. This technique has been validated and described in depth elsewhere (Arnulf & Larsen, 2021; Arnulf, Larsen, & Dysvik, 2018; Arnulf, Larsen, Martinsen, & Egeland, 2018) so only a brief description will be offered here. The semantic compliance with the survey structure can be estimated for every respondent by the so-called response-distance matrix. Again, this matrix is structurally identical to the correlation matrix. However, this matrix is obtained by calculating the absolute distances between the responses in any two item pairs of the survey. For example, for two items i and j, if a person has scored 4 and 5, the absolute distance will be ABS(4–5) = 1. For a person with the scores 1 and

5, the same distance will be ABS(1–5) = 4. For a person scoring 1 and 2, however, the distance will be ABS(1–2) = 1, the same as for the first person, although their score levels (attitude strengths) are different.

The importance of this is that the item-distance matrix is independent of the score levels. For any person, their item-distance matrix will reflect how similar or dissimilar this respondent experiences the items. In this way, the item-distance matrix can be computed for every respondent and compared to the semantically expected matrix. *The more a person deviates from what is semantically expected, the more this person is overriding the cognitive constraints of the survey*.

Note, however, that there is one condition that may make these matrices somewhat dissimilar: It is possible for two different items to obtain the same scores but for independent reasons. This condition adds uncertainty to the semantic matrix or the individual item-distance matrices so that these are only approximations but rarely completely similar to the observed matrix. Also, correlations can be negative, but there are no negative numbers in semantic spaces. It is important to see semantic values as identities of topics, such that a positively or negatively formulated topic is still the same topic, even if negated. This problem is usually treated by comparing the semantic values to the absolute correlations, reducing some of the information (Arnulf et al., 2020).

In the following, we will explore the relationship between the empirically obtained correlation matrix and the semantically expected matrix, with special emphasis on the semantic compliance (cognitive constraints) of the individual respondents.

5. Results

We first checked the relationship between the empirically obtained data and the semantic matrix to see if the semantics did allow a significant prediction of the survey structure. The correlation between the semantic and the empirical matrix (absolute values) was $r = 0.11$, $p < .001$. One limitation of LSA is that it cannot take the context of texts into account (Dennis et al., 2013), but people regularly do this (Kay, 1996). We also made a general linear regression model entering a dummy variable for "same scale", as used in previous publications with this method (Arnulf et al., 2014). The ensuing adjusted R^2 was 0.71. Since this number can be suspected of overfitting the model, we proceeded by keeping the non-corrected values as a conservative estimate of the survey's cognitive structure. The regression model shows however that the semantic matrix is significantly similar to the observed correlation matrix. In other words, the respondents did read and perceive the items in semantically predictable ways, but with considerable deviations from the predicted structure.

We then compared the factor structures of the empirical matrix to the semantic matrix, beginning with a principal component analysis (PCA) of the two matrices. Theoretically, we assume three factors: *First*, a self-image factor consisting of physical appearance, health, IQ and EQ. *Second*, a Cover-Up-factor comprised of all the CU items. *Third*, a self-esteem scale composed of all self-reported strengths.

Table 1 shows CUs associated with education and self-ratings. Asking for three factors, the PCA returns three clearly discernable factors from the empirical matrix – albeit with the reservation that self-rated EQ clusters with the strengths factor, and that several of the strengths items also load on the self-image factor. The LSA-generated semantic matrix is not far from the empirical values (see Table 2). However, the semantic matrix indicates that the strength-items are much more scattered in their relationship than what the empirical matrix shows.

The distributions in Table 2 indicates that there is an underlying factor structure common to the two matrices, but there are also indications that there is a "leakage of cognitive content" (semantic meaning) from the self-descriptive strength items over to the two other factors. Empirically, there is a leakage of relationships between the self-descriptive strengths and the self-image which is thematically natural. Empirically however, there seems to be a strict distinction between the cover-up items (CU) and the self-descriptive items.

While the CU items appear as one common factor in the empirical analysis, a closer look at the semantic properties of the items reveals that there is a more nuanced pattern to be found. Cover-up attempts are not created equal. Using the semantic matrix alone as input to PCA, they fall into four clearly distinct groups:

It may seem contrived to use the semantic input as basis for a principal component analysis, but the empirical data do show that these four factors display significantly different score levels, see Fig. 1. Clearly, while the possibilities of CUs seem to cluster as responses, the respondents do see differences in their likelihood.

We then explored how the semantic compliance of each single respondent influenced the scores of the cover-ups. Table 3 shows how our two hypothesized variables relate to our set of measures. On the top of the table, three variables are correlated: The attitude strength of cover-up beliefs with the semantic compliance of the respondents. In the middle, we report the numbers for how typical each respondent is to the sample trend. This variable is computed in the same way as the semantic compliance, but the individual response distance-matrix is here correlated with the empirically observed correlation matrix instead of the semantic matrix. These two measures are then computed in the same way but whereas semantic compliance describes the cognitive acuity of the respondents, the typicality uses the same data to simply show how typical the respondent is as a representative of the sample.

It appears from Table 4 that elevated levels of beliefs in cover-ups stand out from the sample, and they are not compliant with the semantic structure. Clearly, people with strong beliefs in cover-ups are untypical respondents who also violate the cognitive constraints in the survey. The same variables seem significantly related to sex, but not to age.

The semantic predictability is strongly and negatively related to elevated estimates of self-image, with the possible exception of EQ. Most importantly however, the data indicate that elevated self-esteem factors are correlated with a tendency to neglect the cognitive constraints of the

Table 1
Zero-order correlations between the main variables. Correlations with semantic compliance reversed for ease of interpretation (positive correlations = higher compliance). * = p < .05; ** = p < .01.

	Sex	Age	Formal schooling	Degree	Ph. attractive	Health	IQ	EQ	Cover-up total	Sum strengths
Sex										
Age	−0.30**									
Formal schooling	0.03	−0.10								
Degree	0.02	0.03	0.52**							
Ph. attractiveness	−0.05	−0.07	0.06	0.09						
Health	−0.14**	0.07	0.10*	0.10*	0.53**					
IQ	−0.18**	0.10	0.17**	0.23**	0.49**	0.44**				
EQ	0.23**	−0.11*	0.06	0.06	0.35**	0.23**	0.36**			
CUtot	−0.14**	0.08	0.05	0.03	−0.05	0.08	−0.04	−0.20**		
Cover-up total	−0.04	−0.01	0.12*	0.15**	0.80**	0.78**	0.73**	0.65**	−0.06	
Semantic compliance	0.14**	−0.06	−0.13**	−0.12*	−0.27**	−0.18**	−0.21**	−0.06	−0.43**	−0.24**

Table 2
Factor loadings from principal component analysis of the empirical (left three columns) and the semantic (three rightmost columns) matrices. Emphasized cells >0.40. * = p <.05; ** = p < .01.

	Empirical correlations			Semantic values		
	Empirical factor 1	Empirical factor 2	Empirical factor 3	Semantic factor 1	Semantic factor 2	Semantic factor 3
Physical attractiveness	.22	-.03	**.49**	*-.14*	*.10*	***.63***
Physical health	.08	.10	**.57**	*-.16*	*.13*	***.60***
IQ	.23	-.03	**.70**	*.25*	*-.02*	***.57***
EQ	**.44**	-.18	.15	*.17*	*.03*	***.84***
Cover-up item 1	-.08	**.47**	-.03	*.23*	***.78***	*.23*
Cover-up item 2	-.13	**.58**	.16	*.19*	***.60***	*.10*
Cover-up item 3	-.19	**.65**	.33	*.05*	***.76***	*.24*
Cover-up item 4	-.06	**.69**	.12	*.15*	***.60***	*.11*
Cover-up item 5	-.01	**.55**	-.27	*.14*	***.77***	*.40*
Cover-up item 6	-.04	**.60**	.13	*.32*	***.58***	*.30*
Cover-up item 7	.05	**.67**	-.05	*.27*	***.62***	*.51*
Cover-up item 8	-.02	**.66**	-.09	*.35*	***.66***	*.30*
Cover-up item 9	.04	**.55**	-.25	*.21*	***.83***	*.19*
Cover-up item 10	-.11	**.69**	.07	*.15*	***.68***	*.27*
Cover-up item 11	-.15	**.71**	.07	*.27*	***.65***	*.28*
Cover-up item 12	-.04	**.73**	.11	*.18*	***.50***	*-.07*
Cover-up item 13	-.13	**.74**	.15	*.34*	***.75***	*.03*
Cover-up item 14	-.04	**.73**	-.08	*.37*	***.79***	*.10*
Cover-up item 15	.03	**.66**	-.19	*.10*	***.72***	*.32*
Cover-up item 16	.05	**.70**	-.26	*.22*	***.69***	*.41*
Cover-up item 17	-.08	.31	-.28	*.23*	*.61*	*.16*
Strength item 1	**.60**	-.12	.36	*.24*	*.63*	*.29*
Strength item 2	**.57**	-.14	**.46**	***.42***	*.39*	*.37*
Strength item 3	**.67**	-.03	.32	***.47***	*.61*	*.22*
Strength item 4	**.55**	-.05	**.45**	*.38*	*.31*	*.29*
Strength item 5	**.71**	-.13	.13	*.29*	*.30*	***.79***
Strength item 6	**.66**	-.06	**.41**	***.43***	*.54*	*.03*
Strength item 7	**.58**	-.09	**.42**	***.60***	*.19*	*.07*
Strength item 8	**.55**	-.04	**.44**	***.47***	*.13*	*.38*
Strength item 9	**.77**	-.01	.13	*.39*	*.27*	***.44***
Strength item 10	**.83**	-.07	-.01	*.34*	*.42*	*.38*
Strength item 11	**.80**	-.08	-.05	***.53***	*.40*	*.35*
Strength item 12	**.77**	'00	.03	*.20*	*.48*	*.31*
Strength item 13	**.77**	-.07	.13	*.22*	*.29*	*.33*
Strength item 14	**.51**	.01	.39	*.04*	*.48*	***.42***
Strength item 15	**.47**	.11	**.50**	*.21*	*.38*	***.57***
Strength item 16	**.48**	.06	.39	***.44***	*.47*	*.08*
Strength item 17	**.71**	-.01	.12	***.70***	*.08*	*.10*
Strength item 18	**.61**	-.09	.30	***.57***	*.44*	*.39*
Strength item 19	**.80**	-.04	.01	***.68***	*.22*	*-.04*
Strength item 20	**.69**	-.06	.17	*.15*	*.23*	*.38*
Strength item 21	**.54**	-.1	-.08	***.41***	*.46*	*.36*
Strength item 22	**.72**	.03	-.05	*.38*	*.53*	*.12*
Strength item 23	**.64**	-.1	.06	***.44***	*.39*	*-.08*
Strength item 24	**.71**	-.09	.23	*.36*	*.25*	*.23*

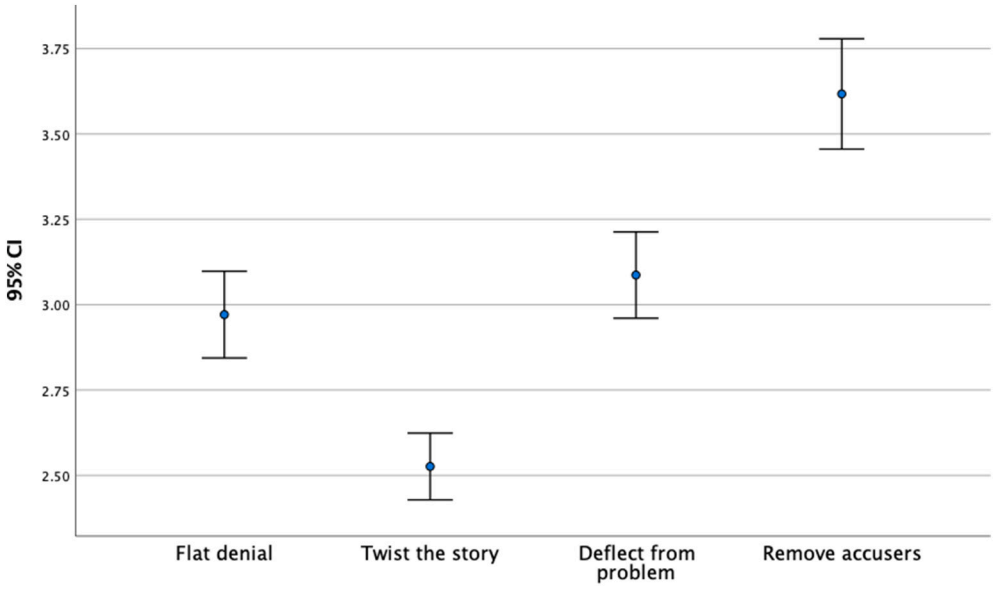

Fig. 1. Mean score levels with 95 confidence intervals of the four semantically derived factors of cover-ups.

Table 3
The four factors of cover-up items using only semantic data as input (focus factors indicated by bold types, possible cross-loadings in italics):

Factor no	Item text	Item no	Semantic factor 1	Semantic factor 2	Semantic factor 3	Semantic factor 4
1	Flat denial about the event or accusation	1	0.37	0.50	−0.21	−0.14
1	Attempts to convince all media to “bury the story”	2	0.83	0.01	0.09	0.09
1	Bribe or intimidate the press	3	0.35	0.44	0.09	−0.04
1	Distribute false information before “the story breaks”	4	0.78	0.01	−0.12	0.04
2	Insist the event or issue is minor or trivial or common	5	0.23	0.46	0.04	−0.15
2	Try all legal means to stop delay block any publicity	9	0.03	0.53	−0.07	0.24
2	Simply lie and commit perjury	11	0.01	0.43	0.36	−0.06
2	Intimidate witnesses and whistle-blowers	12	−0.19	0.68	−0.04	0.02
2	Remove, retire or transfer those accused in the organisation	15	−0.11	0.33	0.27	0.29
2	Hire the best lawyers	17	−0.31	0.24	0.26	0.15
3	Claim the accusers have false memory	6	0.12	0.29	0.31	−0.06
3	Suggest the critics accusers have unrelated ulterior motives	7	0.00	−0.03	0.85	0.00
3	Attack the critics or accusers character	8	0.51	−0.10	0.51	−0.06
3	Try to destroy the evidence	10	−0.13	0.35	0.44	0.14
3	Scapegoat by blaming less important, incompetent people	16	0.05	−0.07	0.11	0.05
4	Use of threats blackmail to get them to back down	13	0.06	0.00	−0.16	0.84
4	Transfer critics to get them out of the way	14	0.04	−0.01	0.14	0.84

survey structure. All facets of cover-up beliefs are strongly and negatively correlated with semantic compliance. This is particularly true for the most elevated of the scores, the brutal assumption that accusers will simply be removed. Thus, Hypothesis 1 is supported, stating that there will be significant positive correlations between beliefs in the prevalence of corporate cover-up activities and deviation from the cognitive structure of the survey questions.

To summarize the relationship between attitude strength and semantic compliance, we regressed all the variables on semantic compliance (see Table 5). As indicated by the data in Table 4, there are three self-reported variables that predict willingness to inflate endorsement of cover-ups: inflated physical attractivity, and belief in denial and removal of accusers. Conversely, high semantic compliance seemed to favor versions of cover-up that imply twisting of stories. Additionally, the claim to be a person described by curiosity also seems to deviate from semantically expected patterns. The results in Table 4 support our hypothesis 2, stating that the tendency to override the cognitive constraints of the survey will be significantly correlated with self-reported characteristics.

6. Discussion

The purpose of this study was to see if a strong belief in cover-up activities displays a two-way relationship, linking perceptions of self with a willingness to override cognitive constraints in order to establish a global response set in favor of the respondents' strongest attitudes. The results of our analyses supported both hypotheses.

In this study we were able to create two frameworks for analyzing the response patterns. One was the statistics made up of the attitude strength of respondents towards cover-ups, the second was a measure of their cognitive consistency in complying with the semantic structure of the survey. We showed that the data indeed possess a semantic structure that allowed a replication of the same factor structure that was apparent in the regular correlation matrix.

However, the semantic information indicated a more detailed, fine-grained information structure in the questions making up the questionnaire. For example, we were able to show that beliefs in cover ups have four clear dimensions which were clearly interpretable, and that showed up in the response data as eliciting significantly different response levels. At the same time, these dimensions were significantly intercorrelated around $0.50 < r < 0.60$, suggesting a general factor. It is this general factor that seems to energize and elevate the ratings given

Table 4
Relationships between beliefs in cover-ups and the respondents' individual response patterns (signs reversed in the two rightmost columns for ease of interpretation). * = p < .05; ** = p < .01.

Variable types	Individual indicators	Sum cover-up beliefs	Response typicality	Semantic predictability
Cover-up beliefs and response patterns	Sum cover-up beliefs	1.00	−0.62**	−0.43**
	Response typicality	−0.62**	1.00	0.12*
	Semantic predictability	−0.43**	0.12*	1.00
Demographics	Sex	−0.14**	0.05	0.14**
	Age	0.08	0.03	−0.06
	Education in years	0.05	−0.05	−0.13**
	Degree	0.03	0.04	−0.12*
Self-rated qualities	Physically attractive	−0.05	0.31**	−0.27**
	Physcial health	0.08	0.17**	−0.18**
	IQ	−0.04	0.29**	−0.21**
	EQ	−0.20**	0.40**	−0.06
	Sum self esteem	−0.06	0.38**	−0.24**
Self-esteem factors	Integrity	−0.13*	0.45**	−0.19**
	Loving	−0.12*	0.50**	−0.25**
	Curiosity	−0.16**	0.39**	−0.27**
	Spirituality	−0.17**	0.54**	−0.17**
Cover-up factors	Flat denial	0.82**	−0.47**	−0.41**
	Twist the story	0.92**	−0.57**	−0.30**
	Deflect from problem	0.88**	−0.55**	−0.35**
	Remove accusers	0.83**	−0.54**	−0.46**

Table 5
Prediction of semantic compliance in multiple regression, adjusted $R^2 = 0.41$, p < .001 (signs reversed for ease of interpretation).

Variable	Std. beta	t	Sig.
Constant	−0.05		−4.65
Sex	0.07	−1.47	ns.
Age	0.02	−0.41	ns.
Years of schooling	−0.04	0.85	ns.
Degree	−0.04	0.83	ns.
Physical attractiveness	−0.23	4.60	<0.001
Physical health	0.05	−1.03	ns.
IQ	0.08	−1.55	ns.
EQ	−0.01	0.18	ns.
Flat denial	−0.29	5.08	<0.001
Twist the story	0.21	−2.95	0.003
Deflect from problem	−0.08	1.27	ns.
Remove accusers	−0.44	7.23	<0.001
Integrity	0.11	−1.25	ns.
Loving	−0.18	2.07	0.039
Curiosity	−0.27	4.06	<0.001
Spirituality	0.03	−0.44	ns.

by some, but not all the respondents, and that contributes to a general CU-factor appearing in the PCA produced from the response data.

Our data also indicated that only some, but not all respondents have this tendency to generally elevate their expectation for all sorts of cover-ups. As we computed the "typicality" of individual response patterns, the data suggested that the majority of the sample refrained from indiscriminate expectations of cover-ups. The respondents who displayed the strongest beliefs in cover-ups were also most likely to depart from the semantic structures in the survey items. In this way, they respond more aligned with argumentation theory (Mercier & Sperber, 2011), displaying confirmation bias as they choose responses rather than acting systematically on the semantic cues for reasoning offered by the item texts.

As we could compare the responses to self-descriptive statements with responses to the cover-up items, we were able to examine the respondents' behaviors along two dimensions. Thus, we could use the distinction between attitude strength and cognitive structures to explore how self-image and self-rated strengths were linked to the respondents' semantic compliance. Where cognitive cues are disregarded, this seemed to be most strongly pronounced in people who inflate their physical attractivity and curiosity, favoring the belief that companies engage in flat denial and removing accusers. It is interesting also to note that physical attractiveness is the one question of the four self-image items contributing most to the alpha coefficient of these items (removing this item will reduce the alpha from 0.72 to 0.58). When strong response sets overrule cognitive constraints, they seem to favor more "brutal" versions of cover-ups. This finding indicates that strong beliefs in cover-ups may imply a certain defensiveness against threats to self-images. This appears similar to the findings of Green et al. (2022), who showed that conspiracy theories were linked to depression but with stronger effects in well-to-do subjects. To the contrary, people with a tendency for complying with the semantic information in the survey texts are more inclined towards subtle, intellectual types of cover-ups such as twisting truths. Although such respondents are less likely to endorse cover-ups in total, this tendency also shows a relationship between the respondents' own personal strengths and their view of how the world around them may be manipulated. Greater cognitive acuity or effort is a resource to understand more subtle ways that companies may conceal nefarious practices and incidents.

It therefore seems justified to conclude that strong response sets tend to blur cognitive distinctions, prioritizing the expression of strong attitudes at the cost of finer, and subtler, distinctions. This is a demonstration of how cognitive biases go along with strong responses in ways that create the "unreasonable quality" of many conspiracy theories. Once formed, it seems as if holders of such beliefs to some extent are oblivious about the cognitive features of their beliefs, features that would normally lend themselves to argumentation and reasoning.

From a methodological point of view, our study also illuminates another phenomenon: Where respondents produce data that allow clear cut factors to emerge in the analyses, such factors may actually not be due to a clear understanding of the survey as intended by the researchers. Instead, there is always a possibility that some topics in the survey elicit strong attitudinal responses that override the cognitive structures involved. The readiness to respond in differentiating ways seems to imply some level of "cold" cognitive control in the respondents and a certain cognitive distance to the topics of the survey.

7. Limitations

Like all studies this had limitations. *First*, it would have been useful to have an actual measure of participants beliefs in CTs themselves to assess the relationship between cover-up beliefs and CT theories. Equally, it would be interesting to know their news media preference (Print, TV, Web) to understand how that may have influenced their beliefs about cover-ups. *Second* it would have been interesting to know the participants beliefs about which type of individuals (e.g., politicians, scientists) and organizations (pharmaceutical, petrochemical) are most involved in these coverups. *Third*, it would have been interesting to explore some "dark-side" personality factors, like paranoia, that may be closely related to CU beliefs.

Some might have objections to the self-report design of this study. In our opinion, this was precisely what we aimed for: An exploration of how the subjects would construe cover-ups as a non-invasive, non-conspicuous invitation project their views as concomitants of their self-images.

Registration

This paper was not pre-registered with the journal.

Ethics

This was sought and obtained (CEHP/514/2017).

Informed consent

Participants gave consent for their anonymised data to be analysed and published.

CRediT authorship contribution statement

Jan Ketil Arnulf: Conceptualization, Formal analysis, Methodology, Writing – review & editing. **Adrian Furnham:** Conceptualization, Data curation, Project administration, Writing – review & editing.

Declaration of competing interest

There is no conflict of interest.

Data availability

This is obtainable from the first author upon request.

References

Arnulf, J. K., Larsen, K., & Dysvik, A. (2018). Measuring semantic components in training and motivation: A methodological introduction to the semantic theory of survey response. *Human Resource Development Quarterly, 30*(1), 17–38. https://doi.org/10.1002/hrdq.21324

Arnulf, J. K., & Larsen, K. R. (2020). Culture blind leadership research: How semantically determined survey data may fail to detect cultural differences. *Frontiers in Psychology, 11*(176). https://doi.org/10.3389/fpsyg.2020.00176

Arnulf, J. K., & Larsen, K. R. (2021). Semantic and ontological structures of psychological attributes. In D. Wood, S. J. Read, P. D. Harms, & A. Slaughter (Eds.), *Measuring and modeling persons and situations* (pp. 69–102). Academic Press. https://doi.org/10.1016/B978-0-12-819200-9.00013-2.

Arnulf, J. K., Larsen, K. R., Martinsen, O. L., & Bong, C. H. (2014). Predicting survey responses: How and why semantics shape survey statistics on organizational behaviour. *PLoS One, 9*(9), Article e106361. https://doi.org/10.1371/journal.pone.0106361

Arnulf, J. K., Larsen, K. R., Martinsen, O. L., & Egeland, T. (2018). The failing measurement of attitudes: How semantic determinants of individual survey responses come to replace measures of attitude strength. *Behaviour Research Methods, 50*(6), 2345–2365. https://doi.org/10.3758/s13428-017-0999-y

Arnulf, J. K., Larsen, K. R., Martinsen, O. L., & Nimon, K. F. (2021). Editorial: Semantic algorithms in the assessment of attitudes and personality. *Frontiers in Psychology, 12*(3046). https://doi.org/10.3389/fpsyg.2021.720559

Arnulf, J. K., Nimon, K., Larsen, K. R., Hovland, C. V., & Arnesen, M. (2020). The priest, the sex worker, and the CEO: Measuring motivation by job type. *Frontiers in Psychology, 11*, 1321. https://doi.org/10.3389/fpsyg.2020.01321

Arnulf, J. K., Robinson, C., & Furnham, A. (2022). Dispositional and ideological factor correlate of conspiracy thinking and beliefs. *PLoS One, 17*(10), Article e0273763. https://doi.org/10.1371/journal.pone.0273763

Barron, D., Morgan, K., Towell, T., Altemeyer, B., & Swami, V. (2014). Associations between schizotypy and belief in conspiracist ideation. *Personality and Individual Differences, 70*, 156–159.

Bowes, S. M., Costello, T. H., Ma, W., & Lilienfeld, S. O. (2021). Looking under the tinfoil hat: Clarifying the personological and psychopathological correlates of conspiracy beliefs. *Journal of Personality, 89*(3), 422–436.

Brotherton, R., & French, C. C. (2014). Belief in conspiracy theories and susceptibility to the conjunction fallacy. *Applied Cognitive Psychology, 28*(2), 238–248.

Butter, M., & Knight, P. (Eds.). (2020). *Routledge handbook of conspiracy theories*. London: Routledge.

Dennis, S., Landauer, T. K., Kintsch, W., & Quesada, J. (2013). *Introduction to latent semantic analysis*. University of Colorado Press.

Douglas, K. M., & Leite, A. C. (2017). Suspicion in the workplace: Organizational conspiracy theories and work-related outcomes. *British Journal of Psychology, 108*(3), 486–506.

Douglas, K. M., Sutton, R. M., Callan, M. J., Dawtry, R. J., & Harvey, A. J. (2016). Someone is pulling the strings: Hypersensitive agency detection and belief in conspiracy theories. *Thinking & Reasoning, 22*(1), 57–77.

Douglas, K. M., Uscinski, J. E., Sutton, R. M., Cichocka, A., Nefes, T., Ang, C. S., & Deravi, F. (2019). Understanding conspiracy theories. *Political Psychology, 40*, 3–35.

Furnham, A., & Grover, S. (2021). Do you have to be mad to believe in conspiracy theories? Personality disorders and conspiracy theories. *International Journal of Social Psychiatry, 00207640211031614*.

Furnham, A., & Horne, G. (2022). Cover ups and conspiracy theories: Demographics, work disenchantment, equity sensitivity, and beliefs in cover-ups. *Journal of Work and Organizational Psychology, 38*(1), 19–25.

Furnham, A., & Lester, D. (2012). The development of a short measure of character strength. *European Journal of Psychological Assessment, 28*(2), 95–101. https://doi.org/10.1027/1015-5759/a000096

Furnham, A., & Sherman, R. A. (2022). Beliefs about personal change. *Acta Psychologica, 232*, Article 103821.

Galliford, N., & Furnham, A. (2017). Individual difference factors and beliefs in medical and political conspiracy theories. *Scandinavian Journal of Psychology, 58*(5), 422–428.

Gefen, D., Fresneda, J. E., & Larsen, K. R. (2020). Trust and distrust as artifacts of language: A latent semantic approach to studying their linguistic correlates [original research]. *Frontiers in Psychology, 11*(561). https://doi.org/10.3389/fpsyg.2020.00561

Green, J., Druckman, J. N., Baum, M. A., Lazer, D., Ognyanova, K., & Perlis, R. H. (2022). Depressive symptoms and conspiracy beliefs. *Applied Cognitive Psychology, n/a*(n/a). https://doi.org/10.1002/acp.4011

Imhoff, R., & Lamberty, P. K. (2017). Too special to be duped: Need for uniqueness motivates conspiracy beliefs. *European Journal of Social Psychology, 47*(6), 724–734.

Kay, P. (1996). Intra-speaker relativity. In J. Gumperz, & S. C. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 97–111). Cambridge University Press.

Kyngdon, A. (2006). An introduction to the theory of unidimensional unfolding. *Journal of Applied Measurement, 7*(3), 260–277. https://www.ncbi.nlm.nih.gov/pubmed/16807493.

Landauer, T. K. (2007). LSA as a theory of meaning. In T. K. Landauer, D. S. McNamara, S. Dennis, & W. Kintsh (Eds.), *Handbook of latent semantic analysis* (pp. 3–34). Publishers: Larence Erlbaum Associates.

Larsen, K. R., & Bong, C. H. (2016). A tool for addressing construct identity in literature reviews and meta-analyses. *MIS Quarterly, 40*(3), 529–+. https://doi.org/10.25300/Misq/2016/40.3.01

Martinsen, Ø. L., Arnulf, J. K., & Larsen, K. R. (2016). Respondent robotics: Simulating responses to Likert-scale survey items. *Sage Open, 8*(1), 1–18. https://doi.org/10.1177/2158244018764803

Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behaviour and Brain Sciences, 34*(2), 57–74. https://doi.org/10.1017/S0140525X10000968 (discussion 74-111).

Michell, J. (1994). Measuring dimensions of belief by unidimensional unfolding. *Journal of Mathematical Psychology, 38*(2), 244–273. https://doi.org/10.1006/jmps.1994.1016

Nimon, K., Shuck, B., & Zigarmi, D. (2016). Construct overlap between employee engagement and job satisfaction: A function of semantic equivalence? *Journal of Happiness Studies, 17*(3), 1149–1171. https://doi.org/10.1007/s10902-015-9636-6

Nyhan, B., Dickinson, F., Dudding, S., Dylgjeri, E., Neiley, E., Pullerits, C., … Walmsley, C. (2016). Classified or coverup? The effect of redactions on conspiracy theory beliefs. *Journal of Experimental Political Science, 3*(2), 123.

Rosenbusch, H., Wanders, F., & Pit, I. L. (2020). The Semantic Scale Network: An online tool to detect semantic overlap of psychological scales and prevent scale redundancies. *Psychological Methods, 25*, 380–392. https://doi.org/10.1037/met0000244

Sullivan, D., Landau, M. J., & Rothschild, Z. K. (2010). An existential function of enemyship: Evidence that people attribute influence to personal and political enemies to compensate for threats to control. *Journal of Personality and Social Psychology, 98*(3), 434.

Sunstein, C. R., & Vermeule, A. (2009). Conspiracy theories. *Journal of Political Philosophy, 17*(2), 202–227.

Sutton, R. M., & Douglas, K. M. (2020). Conspiracy theories and the conspiracy mindset: Implications for political ideology. *Current Opinion in Behavioral Sciences, 34*, 118–122.

Swami, V., Coles, R., Stieger, S., Pietschnig, J., Furnham, A., Rehim, S., & Voracek, M. (2011). Conspiracist ideation in Britain and Austria: Evidence of a monological belief system and associations between individual psychological differences and real-world and fictitious conspiracy theories. *British Journal of Psychology, 102*(3), 443–463.

Swami, V., & Furnham, A. (2012). Examining conspiracist beliefs about the disappearance of Amelia Earhart. *Journal of General Psychology, 139*(4), 244–259.

Uscinski, J. E., & Parent, J. M. (2014). *American conspiracy theories*. Oxford University Press.

Van Prooijen, J.-W., Krouwel, A. P., & Pollet, T. V. (2015). Political extremism predicts belief in conspiracy theories. *Social Psychological and Personality Science, 6*(5), 570–578.

Walter, A. S., & Drochon, H. (2020). Conspiracy thinking in Europe and America: A comparative study. *Political Studies, 00323217209726l6*.