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Exploring cross-cultural conflict studies through semantic algorithms

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Abstract

The way people handle conflicts differ from one culture to another culture, but why are the cross-cultural research findings showing the same results for both Asian and Western cultures?

The purpose of the study is to gain clarity on the limitation of cross-cultural methodology within the conflict topic. This was investigated through digital text analyses and thereby linked to 11 published studies on Chinese culture. The algorithm was used to test the semantic relationship between scale and to recreate the original findings from the previous published studies. The semantic algorithm knows nothing about culture or conflict as a topic but gained almost the same results as the survey-based method where the Chinese population were the respondents. This shows that the methodology used when conducting cross-cultural research has several limitations that needs to be taken into consideration. Research methods used in cross-cultural research therefore needs to be reviewed and complemented by objective statistics rather than self-rating questionnaires as they are proven to not capture attitude strength and thereby cultural differences. Current conflict theories should be tested through measurements items developed by local researchers to ensure that the specific theory is valid within a geographical culture. Across both geographical areas and sample groups, the results reflect the same since surveys only can answer the semantic relation of the sentences, but not detect the cultural differences.

1.0 Introduction

The collection of quantitative data through surveys is one of the most frequently used methodologies in organizational research. Well known in his field is Yukl (2013) points out that the methodologies are found especially in the case of cross-cultural research. The cross-cultural research has become increasingly more important throughout the years due to globalization. Individuals are moving across borders, organizations are expanding internationally and outsourcing large parts of their production to different geographical areas. This makes the understanding of different cultures highly important as both the individual employee and organizations needs knowledge of how to communicate, behave and interact with and within new cultures. Due to the survey method popularity within the cross-cultural research, translation of measurements is in turn a topic of discussion. Sperber (2004) found in his research that translation of a study instrument is often overlooked and treated as an unimportant part of the research. If researchers were to neglect the importance of the translation, the validity and reliability of the measurements would be threatened, which in turn will continue to threaten the results and conclusions found, as the measurements are not valid.

This study explores the cultural differences between conflict management between the Eastern, specifically Chinese, and Western cultures. Previous research has found similarities in how conflict is handled, even though general assumption is completely different. A rather new theory, the Semantic Theory of Survey Response (Arnulf & Larsan, 2015; Arnulf, Larsen, Martinsen, & Bong, 2014), proposes that the results from such survey-based research may potentially come from the degree of semantic overlap among the scale items rather than from the real attitudes of respondents. Thereby, this study aims to answer the following research question *“are cross-cultural conflict studies in China truly capable of detecting cultural differences?”*.

2.0 Theory

2.1 Surveys and cross-cultural research

The collection of quantitative data through survey is one of the most frequently used methodologies in organizational research (Yukl, 2013). Most common is the so-called Likert-scale items, developed by Rensis Likert, where the respondents rate a statement on a scale from “strongly agree” to “strongly disagree” or similar (Arnulf, et al., 2014). The respondent’s answers are coded into a statistical measurement program, such as SPSS, that runs an analysis to give meaning to the data collected. Several methods are used to ensure the validity and reliability of the surveys, such as through Cronbach’s alpha and exploratory and confirmatory factor analyses. This is to ensure that the items do belong in the same scale and measure the same latent variable and the survey are perceived as valid and reliable if the measures come to such a conclusion.

Even though this is the general assumption, these statistical methods of scale creations have for a longer period of time been criticized for their validity. Maul (2017) found that surveys based on items that did not have any meaning passed both Cronbach’s alpha and the confirmatory factor analysis. When comparing well-established surveys with surveys based on questions with nonsensical words, he found that the nonsense questions were almost just as valid as the well-established surveys. Likert assumed that his scales delivered measures of attitude strength (Likert, 1932), and that the following statistical patterns were indicative of behavioral disposition or tendency (Arnulf, 2019). However, recent research has raised suspicion that the respondent’s responses may not always reflect the true “attitudes” toward the topic in question. The respondents are simply calculating their own responses based on how they respond to other parts of the survey (Arnulf, 2019). By this, the surveys used may be flawed even before they are handed out to respondents, which makes it difficult to provide meaningful and credible research results. Thurstone (1947) claimed that “*attitudes can be measured, but as a result of imperfection in the statement and inaccuracy of the subjects, not everyone would respond accurately*”. He did not directly state where the source of the “inaccuracy” is from, but one could imply that a key burden is potentially from how respondents rate measurement items. This argument is also supported by Kjell, Kjell, Garcia,

and Sikström (2018); human's state of mind are limited in expressing or communicating information due to the limited options provided in the numerical format since we communicate words in our daily life more than numbers.

Most theories within the organizational behavior field are developed by Western researchers, and therefore also the scales, which in turn also means that most of the scales are originally composed in English as well. When conducting cross-cultural research, the scales are thereby translated to other languages, such as Chinese. The back-translation is currently the most dominant translational method used in cross-cultural research. This is likely mainly due to the relative ease with which the process is carried out (Khalaila, 2013). However, translation of a questionnaire from one language to another does raise many equivalence issues for cross-cultural researchers, which are especially noticeable when the target language has different dialects, such as in the Chinese language. In the back-translation method, the questionnaires are first translated from the original language to the target language, and then the target translation is translated "blindly" back into the original language by an independent translator (Khalaila, 2013). The translator tries to change as little as possible in the final version of the original language (Brislin, 1970). This method yields two versions of the instrument: the original language version and the back-translated version. Comparison of the two provides a baseline for further explanation of problematic areas and concepts (Khalaila, 2013, p. 367)

Spreber (2004) noted in his research that translation of a study instrument is often an afterthought. It is treated as an unimportant part and often implemented without attention to the issues involved. He/she also states that there are these issues that threatens the validity and reliability of the measurements. Yukl (2013) states that when fixed-response questionnaires are used in cross-cultural research it becomes difficult to achieve equivalence in meaning when the questionnaires are translated into other languages (p. 370). Even though the majority of cross-cultural studies relies on the back-translation method to ensure that the questions meaning are preserved, Yukl (2013) states that it is still hard to ensure equivalence. For example, it can be hard to ensure vocabulary equivalence, such as when a word does not exist in the target language or when the dictionary defines one word in a number of ways or terms in the target language. Another example is with idiomatic equivalence, that

cannot be obtained when researchers employ direct translation of an idiom because it would not make sense. Therefore, to ensure the validity and reliability of the measurements, the translators need to be familiar with the real meaning of the idioms to maintain idiomatic equivalence (Khalaila, 2013).

Further, Russell (1991) states that the success of the back-translation method is insufficient because it can only achieve the best translation, which might not be an exact equivalent (p. 433). Unless the translator is familiar with both the cultural nuances and the specific theoretical implications of the terms being translated, the translation might not even be the “best”. Instead, the translation is only a reflection of a best effort based on the limited information available for the translator (Russell, 1991). This corresponds with Cha (2007) that noted that accessibility and availability of qualified bilingual people who have knowledge of the original and target languages, both cultures and the local area of the research is key when using this method.

2.2 Semantic Theory of Survey Response

Most cross-cultural research conducted today are based on survey methods with the intent of measuring attitude strength. However, the methodology has been criticized for measuring something entirely different, namely semantic consistency in responses (Arnulf, Larsan, & Dysvik, 2018). The Semantic Theory of Survey Response (STSR) is a psychological theory that entails why individuals reply the way they do in questionnaires. It proposes that when respondents are given a survey, they are able to see the similarity between items and will thereby try to be consistent in their answers (Arnulf et al., 2018). For example, the linkage between “I like my job” and “I do not want to quit my job”. If one answers “strongly agree” for the first question, the tendency to answer “strongly disagree” for the latter is high. This contradicts other viewpoints on survey respondents, such as Likert’s assumptions that his scales delivered measures of attitude strength (Likert, 1932). Instead, STSR claims that when respondents answer a questionnaire, they must first understand the meaning of each question. The statistical patterns in the data from the questionnaires primarily represent how equal the respondents perceive the questions. This is important because it means that statistical contexts in data are

given in advance – that is, before anyone at all has answered the questionnaires (Arnulf et al., 2018; Arnulf et al., 2014),

However, the semantic overlap is still required to create coherency of the questionnaire or “*intra-scale consistency*”; the overlap should arise only within the scale. If two different scales measuring two different constructs have a high semantic overlap, then the two constructs will automatically be correlated. Consequently, a real phenomenon is not accurately captured because of the misconducting of instruments (Arnulf et al., 2014). These mentioned problems have brought us to the question that the quantitative outcomes of the survey-based method may potentially come from the degree of semantic overlap among the scale items rather than from the real attitudes of respondents (Arnulf et al., 2015; Arnulf et al., 2014). In their study, Arnulf et al. (2014) examined the semantic overlap in survey research. They showed how respondents do not answer directly to the specific item itself, but rather according to what was semantically expected by them. Text algorithms, such as Latent Semantic Analysis, was able to predict responses to surveys that would be obtained from real human subjects and explained between 60 to 86% of the variation in the sample (Arnulf et al., 2014).

2.3 Latent Semantic Analysis

The opportunity to test out the STSR in practice has been made available through the development of digital text analyses, such as Latent Semantic Analysis (LSA). There are a number of algorithms using for semantic analyzing-purpose, but LSA was selected because it has previously been published and the calculations are possible to replicate (Arnulf et al., 2018; Arnulf et al., 2014). LSA makes it possible to make quantitative comparisons of meaning in paired texts, such as questionnaires which was firstly introduced by Landauer, Foltz, and Laham (1998). It is a purely mathematical approach to language and have previously been shown to perform very similar to the human language by learning using large chunks of texts as its inputs. It is fully automated, thus, no need to use humanly constructed dictionaries, knowledge comes directly from perceptual information as inputs. The algorithm estimates the meaning of words and sentences based on their actual use across these large chunks of text from “real” sources of text information. Sources from specific industries are also served as the inputs such as business articles, PR texts,

newspapers, psychology and management research (Landauer et al., 1998). These sources of text information, thus, allows LSA to be more closely related to working and management topic (Arnulf et al., 2014). LSA functions by analyzing these texts to create a high dimensional “semantic space” in which all terms have specific locations, represented as vectors. Every survey item will be projected against each semantic space which turns into mathematical outcomes, and this is the technique LSA represent; the value of semantic similarity as an output or so-called “cosine” (Arnulf et al., 2018). LSA also estimates the degree to which the expressions that appear in a similar context by analyzing the frequency of repeated words over several contexts. Regarding synonyms, the algorithm can detect even when two sentences have no words in common. For example; “*doctors operate on patients*” and “*physicians do surgery*”, cosine values .80 showing a high overlapping meaning. On the other hand, sentences with similar words do not necessarily appear as similar (Arnulf et al., 2014).

2.3.1 Latent Semantic Analysis and its problem of signs

The direction (sign) of semantic similarity should be paid attention on. “Meaning” depends on “context and tones” but seem like the current capability in computational language understanding generally ignore these factors (Garten (Garten, Kennedy, Hoover, Sagae, & Deghani, 2019). LSA also suffers from it since the algorithm was not able to differentiate well between positive and negative direction, a contrary statement and a revered- items e.g. the word “does” and “does not” (Arnulf et al., 2018). Hence, the interpretation of negative sign may create confusion.

2.4 Conflict and conflict management

Conflict is an inevitable natural phenomenon in everyday lives, especially in an organizational setting where different people work together. It can be defined as “the joint presence of disagreement” and explained as situations where two or more interdependent parties, either individuals or groups, have interests, outcomes or goals that are incompatible in some way (Deutsch, 1973). If the party’s interests, outcomes or goals are completely compatible, then no conflict can exist because there is nothing to fight about (p. 2).

Conflict was, in the beginning of its research period, perceived as a competitive and destructive aspect (Deutsch, 1973). However, is conflict always a bad thing? (Deutsch, 1949) argued that conflict can both be constructive as well as destructive, which have different wide-ranging effects based on how people have attitudes toward obtaining goals. He developed the theory of cooperation and competition (1973) proposing that both positive and negative goal interdependencies can lead to different conflict outcomes. Positive goal interdependence refers to the degree of goal fulfilment of one party that is positively correlated to the goal's fulfilment of other parties, negative goal interdependencies, on the other hand, refers to one party's success correlating with the other's failure (Deutsch, 1973; Deutsch, Coleman, & Marcus, 2011). If we are positively linked to another, we succeed or fail together. If we achieve our goal, they tend to achieve their goals as well. Since we need to rely on each other, this situation develops a cooperative relationship where the parties have a win-win orientation. Oppositely, if we are negatively linked to another, if the other wins, we lose and if the other loses, we win. Such situations tend to create competitive relationships with a win-lose mindset. (Deutsch, 1973; Deutsch et al., 2011). The attitude of positive or negative goals displays in cooperative or competitive conflict management styles which effect on what people expect and how they interact with other parties when it comes to conflict handling. Approaches to conflict management are not limited to only two types. Rahim (1983) proposed five styles of handling conflicts; integrating, obliging, dominating, avoiding and compromising. The styles are classified based on 1) how much a person attempt to satisfy his own issue or concern and 2) how much a person attempts to satisfy the concerns of others. The researchers related the styles into the earlier conflict concepts by proposing that integrating, obliging and compromising can be classified as cooperative style as decisions are affected more by others concern than oneself. On the other side, avoiding and dominating can be classified as competitive style since judgements show more self-concern (Rahim, 1983). Avoiding as a general approach for conflict managing is seen as much more common in East Asian cultures than in Western cultures. It can be explained as "refusing both overt recognition of a conflict and engagement in any active action toward its resolution" (Ohbuchi & Takahashi , 1994, p. 1347). Morris et al. (1998) found that Chinese are more likely to avoid than Americans, whereas Americans are more likely to use a competitive or dominating strategy than

Chinese. Also, This is similar to Bond and Hwang (1986) findings that Chinese strategies for conflict management are characterized by using indirect language, middlemen, face-saving strategies. Tactics such as open debate, which requires direct communication, often more Western typical. Avoiding conflict is seen as an ineffectual approach as it does not eliminate the conflict, but rather makes it more likely that team members will resolve it through competitiveness (Deutsch, 1973). Avoiding conflict has been found to be an antecedent of competitive interaction, as when the conflict comes to surface, it is handled in a competitive, win-lose way, that undermines both task performance and relationships (Deutsch, 1973).

Dealing with conflict will always be a part of an organization and the employees' workday. People are not only continually confronted with conflict, but they must also manage conflict to work successfully; therefore, conflict management study has been applied to several settings and linked to different outcomes to create more understanding. Conflict in organizational teams is one of the favorite topics, researchers have paid attention to both within and between organizations including external partners and customers (Alper, Tjosvold, & Law, 2000; Wong, Tjosvold, Wong, & Liu, 1999a, 1999b). Common findings indicated that cooperative approach leads to mutual exchange and an open-minded discussion that in turn, strengthen the quality of negotiation, team performance, future collaboration and citizenship behavior. Oppositely, competitive approach tends to avoid and have a closed- minded discussion and use coercive tactics (e.g., persuading or violence) which result in low productivity, frustration and hostility (Alper et al., 2000; Deutsch et al., 2011; Tjosvold, 1998; Tjosvold, Hui, Ding, & Hu, 2003).

2.5 Conflict management in China

Conflict have been a phenomenon of interest across different countries. Since late 1990, more than one hundred studies on conflict management in the Chinese organizational context have been published. Research developed within the Chinese context from local researchers perceives conflict (*Mao-dun*) as the Western viewpoint does; understanding it as something contradictory and destructive (Chen, 2000). It can be explained as a dynamic relationship of interaction in terms of differences, problems and difficulties (Guo-Ming Chen & Starosta, 1997) This means the perception of conflict in general is the same in East and West. However,

the conflict handling approaches may differ. Based on communication and intercultural theory, culture- and conflict management have an interdependent relationship. Conflict management is mainly reflected in a verbal communication style and language system, which is the approach representing the cultures and thinking patterns (Guo-Ming Chen & Starosta, 1997). Since the way of communicating and communication patterns are highly different from culture to culture; the way of dealing and resolving conflicts are undoubtedly as well. For example, in writing styles, while Westerns have a linear language sequences, the Chinese language tends to be non-linear and is characterized by an indirect writing style that is similar to how they approach conflicts (avoidance, using a third-party). This pattern can potentially become an element of conflict management (Guo-Ming Chen & Starosta, 1997).

Intercultural research supports the argument that Chinese tends to deal with conflict in a non-confrontational manner, particularly within a group situation. This is due to that confrontation may lead to loss of face (*main-zi*) and destroy “harmony” in their relationships or connections (*guanxi*). Harmony is essential because it is considered as an initial value within the Chinese culture. It is the universal path that everyone should pursue, as the Chinese believes that human society can prosper only when harmony is reached. Conflicts are therefore treated as a detractor to harmony (Guo-Ming Chen, 2002; Guo-Ming Chen & Starosta, 1997).

The tendency for Chinese to avoid conflict is mainly attributed to the influence of the Confucian value of harmony, which encourages people to tolerate interpersonal disagreements and transgressions (Gabrenya & Hwang, 1996). By this, the preferences for indirect conflict style or using mediation approaches (third-party) can be a solution to settle conflicts (Guo-Ming Chen & Starosta, 1997; Gudykunst, Ting-Toomey, & Chua, 1988; Yu, 1998). Especially, the mediation approach aims to prevent or solve work arguments and develop harmonious employee-relations in an organization. Case studies have indicated that despite several formal third-party practices established to tackle work disputes (e.g., employee bureau, consolation, or resolution system), when arguments and disputes arises, employees tend to not reach out directly these standard channels. They rather seek to negotiate with the management both directly and indirectly through their own connections or social

networks (e.g. relatives, friends or colleagues). By following this approach, the third party as “a person” plays a significant role to help resolve conflicts in the Chinese context (Liu, 2014).

A lot of alternative techniques are applied in the indirect handling styles, such as avoiding saying no, bribing, gift-giving and using tricks, which is rarely found in the Western society (Guo-Ming Chen & Starosta, 1997). Yu 's (1998) findings on the Chinese strategy of conflict management also supports this perspective. The strategy includes 1) avoid confrontation to keep harmony, 2) seek mediators to reduce the need for direct and emotional response and 3) if none of the mentioned practices work, they rely on a legal approach, the least preferred practice (Yu, 1998). However, keeping harmony is not always positive. The emphasis on specific networking leads to a clear boundary between in-group and out-group members. While the “we” attitude greatly decreases the possibility of confrontation and increase conflict-avoidance tendency, harmony often becomes a victim of distrusting out-group members (Z. Zhang & Zhang, 2013). Consequently, expressing anger and hostility directly to out-group members when confronting incompatible goals are common (Zhang & Zhang, 2013)

Although some theories on conflict within the Chinese culture have been published, empirical studies were rare, with only a few notable examples (Zhang & Zhang, 2013). Cross-cultural conflict studies adopted by Western concepts turn out to be more recognized. The first move of such studies was conducted in early 2000 when (Tjosvold, 1998) explored the linkage of Deutsch's cooperative and competitive conflicts framework (1949) and others organizational outcomes (Tjosvold, 1998). As mentioned previously, most of the cross-cultural conflict studies in China have been conducted through a survey-based method, where researchers translate questionnaires to Chinese language. Similar to the findings in North America, while competitive goals have been found to hinder, team that rate themselves with more cooperative goals contribute to effective teamwork and innovation through open-minded discussion (Hempel, Zhang, & Tjosvold, 2009; Tjosvold, Hui, Ding, et al., 2003), citizenship behavior (Tjosvold, Hui, & Yu, 2003) and effective partnership (Wong & Tjosvold, 2010; Wong, Wei, & Tjosvold, 2011).

Researchers have suggested that the reason behind a Chinese cooperative approach may come from the concept of harmony, where maintaining a good relationship (guan-xi) are a key task in society. The motive to keep harmony leads to a high degree of goal interdependence among parties involved in trust and intimacy, thereby discouraging avoidance (Tjosvold, 1998). This conclusion may contradict to what the native Chinese perspective proposed. As mentioned earlier, ‘avoid confrontation or conflict avoidance’ is perceived as a technique to keep harmony. By this viewpoint, the definition of ‘cooperative approach’ by Chinese potentially differs from the Western standpoint. It also may be against the ‘avoiding style’ by Rahim’s framework, proposed that the style is classified in competitive approach where individuals do not care for both themselves’ and others’ concerns (Rahim, 1983). If the concepts are different, why the findings apply the same for both Western and China?

3.0 Research question

The concern lies in whether the cross-cultural research is actually able to capture the real phenomenon of cultural differences, or only what is proposed by the linguistic structure of the sentences (Arnulf et al., 2015; Arnulf et al., 2014). Especially, in this case, where conflict management is explicitly affected by the way we interact and the languages we speak. If such uniqueness is missing from the current practice of cross-cultural survey research, the results still reliable?

Additionally, if questionnaires can predict outcomes, the responses should be the same everywhere regardless of location and sample groups. As found in the study of semantic linkage within “leadership” as topic by Arnulf et al. (2014) semantic algorithms could explain both the responses and the surveys’ results even though the method was conducted in different languages. The researchers computed text analyses in American-English while collected survey data from only Norwegian respondents through questionnaires translated in the Norwegian version. The concept of leadership cannot be explained the same way in different cultures since the interactions between leaders and employees are unique. This raises the observation that although several steps such as backward translation or validity tests were conducted to ensure that the scales were correctly translated, the outcomes merely show how the same statements are expressible across languages without the

information providing the actual behaviors (Arnulf et al., 2015; Arnulf et al., 2014). This issue, thus, leads to our research question in our master thesis;

Are cross-cultural conflict studies in China truly capable of detecting cultural differences?

To be able to answer the research question, two hypotheses were developed. For the first hypothesis, the aim was to create a more extensive picture of all the scales and to see if the scales could be semantically predicted using semantic algorithms. It is believed that the pattern of scales in the conflict studies should correspond with the theoretical aspect.

Hypothesis 1: The scales used in the selected studies can be semantically predicted

If so, the semantic similarity of the avoiding approach should be closer to the competitive approach than to cooperative approach (H1.1) and the semantic similarity of the other relevant outcomes stated from the selected studies should be closer to the cooperative approach than to the competitive approach to conflict (H1.2)

Seem like the semantic effect do not only determine relationships only within and between scales, but also the pattern of mutual relationships that characterizes the whole model. Even using semantic information alone would present the same pattern of relationships from empirical data (Arnulf et al., 2018). Therefore, a second hypothesis was developed with the aim to test whether semantic algorithms are able to replicate the structural model from survey-based study or not. If the hypothesis is true, the semantic relationship of an indirect path (from independent variables to mediating variables) should be higher than the semantic relationship of a direct path (independent variables direct to the dependent variables).

Hypothesis 2: the mediating model from the selected studies can be explained by semantic patterns.

4.0 Pre-methodology

Inputs: Questionnaire items from previously published studies were used as inputs to conduct semantic analyses. Hence, the purpose of performing a pre-methodology phase was to prepare and cleanse the inputs and to ensure that the scale items were systematically and unbiasedly selected. The original scales used in the actual survey were in Chinese, but the scale items provided by the researchers and used as inputs were in English. The pre-methodology involves two steps 1) criteria for selecting inputs and 2) exemplary dataset.

4.1 Criteria for selecting inputs

The questionnaire items or inputs had to contain the following criteria;

- a) were mainly focusing on conflict (conflict management and response to conflict) as research area/topic
- b) were from a study that has been published in a peer-review journal to ensure quality
- c) were conducted in a cross-cultural study within the Chinese context
- d) were from a study that used Chinese management teams or teams in general in organizational settings as a sample group
- e) were from a study that had a survey-based methodology
- f) a full list of questionnaire items was provided in the article (English version)

Despite the fact that more than a hundred articles on conflict have been published, few provided a full list of the questionnaire items. Therefore, only 11 studies met all the criteria and were selected (*see table 1*). This may cause a sample size too small to be able to conduct a complex analysis, however Arnulf et al. (2018) states in their research that the semantic influences are not only applied to larger samples, but the real characteristics can also show up in the “imperfect” (or small) datasets. The total number of scales from the selected 11 studies were 71, which were huge enough to conduct a semantic analysis and answer the research question. Taking into consideration the reasons above and the limited timeframe and resources at hand, the 11 studies were adequate to create a useful dataset.

Table 1. *List of 11 studies used as dataset.*

Study	Title	Author	Year	Questionnaires and sources
1	Conflict Management for Government and Businesses to Share Effective Practices in China	Wong, Wei and Tjosvold	2011	<ol style="list-style-type: none"> Conflict management approaches by Alper, Tjosvold and Law (2000) <ol style="list-style-type: none"> Competitive approach Cooperative approach Inter-organizational trust by Luo (2008) Practice-sharing by Kwok and Gao (2005) and Mulligan (2001) Partnership effectiveness by Perry, Sengupta, and Krampfel (2004)
2	The impact of interpersonal conflict on construction project performance. A moderated mediation study from China	Zhang and Huo	2015	<ol style="list-style-type: none"> Interpersonal conflict by Jehn (1995) Negative emotions by Van Katwyk et al. (2000), Lazarus (1991) and Parkinson (1995) Project performance by Kissi et al. (2013), Reich et al. (2014) and Yang et al. (2014) Political Skills by Vigoda-Gadot and Meisler's (2010)
3	Unpacking the relationships between conflicts and team innovation	He, Ding and Yang	2014	<ol style="list-style-type: none"> Cognitive conflict by Jehn (1994) and Pelled et al. (1999) Affective conflict by Pelled et al. (1999) Conflict management approaches by Rahim (1983) <ol style="list-style-type: none"> Competitive approach (Dominating and Avoiding) Cooperative conflict (Compromising, Obliging and Integrating)
4	Extending credit to small and medium-size companies Relationships and conflict management	Wong, Wei and Tjosvold	2016	<ol style="list-style-type: none"> Conflict management approaches by Alper, Tjosvold and Law (2000) <ol style="list-style-type: none"> Competitive approach Cooperative approach Customer-orientation by Saxe and Weitz (1982) Transaction cost by Buvik and John (2000) Creditworthiness by Wong, Wei, & Tjosvold (2016)
5	Conflict values and team relationships: conflict's contribution to team effectiveness and citizenship in China	Tjosvold, Hul, Ding and Hu	2003	<ol style="list-style-type: none"> Conflict attitudes by Alper, Tjosvold and Law (2000) The avoid approach conflict by Tjosvold (1985) and Barker et al. (1988) Competitive interaction by Barker et al. (1988) Interdependence by Tjosvold, Andrews, & Struthers (1991) Team effectiveness by Hul, Law, & Chen (1999) and Williams (1988)
6	Guangxi and Conflict Management for Effective Partnering with Competitors in China	Wong and Tjosvold	2010	<ol style="list-style-type: none"> Guangxi by Law et al. (2000) and Wong et al. (2003) Conflict management approaches by Alper, Tjosvold and Law (1998) <ol style="list-style-type: none"> Cooperative approach Competitive approach Partnership effectiveness by Perry, Sengupta, and Krampfel (2004)

7	Linking Transformational Leadership and Team Performance: A Conflict Management Approach	Zhang, Cao and Tjosvold	2011	<ol style="list-style-type: none"> 1. Transformational leadership by Podsakoff et al.'s (1990) 2. Conflict management approaches by Alper, Tjosvold and Law (2000) <ol style="list-style-type: none"> a. Cooperative approach b. Cooperative approach 3. Team coordination by Hackman (1983) 4. Team performance by Zhang, Cao and Tjosvold (2011)
8	Conflict Management for Effective Top Management Teams and Innovation in China	Chen, Liu and Tjosvold	2005	<ol style="list-style-type: none"> 1. Conflict management approaches by Alper et al. (2000) and Barker et al. (1988) <ol style="list-style-type: none"> a. Cooperative approach b. Competitive approach c. Avoiding approach 2. Productive conflict by Alper et al., 2000 3. Team effectiveness by Barker et al. (1988) 4. Innovation by Burpitt and Bigness (1997)
9	Conflict management between and within teams for trusting relationships and performance in China	Hempel, Zhang and Tjosvold	2009	<ol style="list-style-type: none"> 1. Team performance by Ancona and Caldwell (1992) 2. Affect-based trust by McAllister (1995) 3. Cognition-based trust by McAllister (1995) 4. Within-team conflict management approaches by Alper, Tjosvold and Law (2000) 5. Between team conflict management approaches by Alper, Tjosvold and Law (2000)
10	Task conflict, relationship conflict and agreement-seeking behavior in Chinese top management teams	Parayitam, Olson and Bao	2010	<ol style="list-style-type: none"> 1. Task conflict by Jehn (1995) 2. Relationship conflict by Jehn (1995) 3. Agreement-seeking behavior by Knight et al. (1999) 4. Conflict responses by Rahim (1983) <ol style="list-style-type: none"> a. Collaborating b. Avoiding c. Third party 5. Intra-group trust by McAllister (1995)
11	Conflict management and task reflexivity for team in-role and extra-role performance in China	Tjosvold, Hui and Yu	2003	<ol style="list-style-type: none"> 1. Task reflexivity by Carter & West (1998) 2. Conflict management approaches by Alper et al. (2000) and Barker et al. (1988) <ol style="list-style-type: none"> a. Cooperative approach b. Competitive approach c. Avoiding approach 3. In-role performance (Organizational Citizenship Behavior) by Podsakoff et al. (1997) 4. Extra role performance (Organizational Citizenship Behavior) by Podsakoff et al. (1997)

4.2 Exemplary dataset

Based on 11 studies and 71 scales, overlapping scales were removed (as shown in table 1) to ensure that the semantic values would not be redundant between the same items. The overlapping scales refer to same scales that have been used in different studies. These scales were namely;

1. The Conflict management approaches scale by Alper et al. (2000) from study 1, 4, 6, 7, 8, 9 and 11
2. The Avoiding approach conflicts scale by Barker, Tjosvold, and Andrews (1988) from study 5, 8 and 11
3. The Conflict management approaches/ Conflict responses scales by Rahim (1983) from study 3 and 10
4. The Partnership effectiveness scale by Perry Perry, Sengupta, and Krapfel (2004) from study 1 and 6
5. The Team effectiveness/ Team performance scales by Hui, Law, Chen, and processes (1999) from study 5, Zhang , Cao and Tjosvold (2011) from study 7 and by Ancona and Caldwell (1992) by study 9. Although the scales in number 5 were developed from different scholars, questionnaire items measure the same construct (team performance), we thus decided to remove some items showing similar meaning.

After removing the overlapping scales, the present dataset included 42 scales and 251 items left in total. The 251 items were used to create a “term-document matrix”. Preparing a term-document matrix is a pre-step prior to the analysis. In short, this step includes putting all of the items into one table to prepare for comparisons. According to Arnulf et al. (2018), survey items can be turned into a list of item-pair combinations (or a matrix) using the formula;

$$(i * [i-1]) / 2, \text{ where } i \text{ is the number of items}$$

The formula renders the matrix as a list of item pairs, e.g. item 1 with item 2...*i*, then item 2 with item 2...*i* and so on. By following this, one can produce a matrix of $(251*250)/2 = 31,375$ unique pair of items.

5.0 Methodology

Output: After the term-document matrix was prepared, semantic outputs was generated based on the matrix. As previously mentioned in the theory part, the output will be in a form of “cosine” or a value of semantic similarity. This section aims to describe the process of the step-by-step to produce semantic similarity.

Two LSA algorithms, 1) LSA Colorado and 2) LSA package in R (so called LSA R), are served as the analytic tools for the study. The purpose of selecting these tools was due to 1) LSA Colorado is recognized as the initial LSA tools in the field and contains a large database (semantic space) to perform an analysis, thereby it is possible to ensure that the results are close to reality, and 2) LSA R allows for the freedom to customize data and get output on what is wanted, which is beyond LSA Colorado’s ability. In R, it is possible to create an own semantic space based on any dataset available. The capability of data visualization by R can provide an insight of the semantic distance for the whole scales; rather than only seeing the numerical data it includes a figure/illustration. The R script used in this study is attached in the appendix.

LSA Colorado was developed by Laham Landauer (1998). It is available on the LSA website of Colorado University (<http://lsa.colorado.edu/>), while LSA R is developed based on the concept of LSA Colorado (Wild, 2007). R is a software language for statistical computing and graphics, while LSA package is an additional downloadable function. The software is available on R’s website (<https://www.r-project.org/>). Both algorithms have the same foundation and calculating process. By applying Arnulf (2014)’s framework, the process can be explained into three core steps,

Step 1. Creating Semantic space

A semantic space is a mathematical representation of a large amount of text where every term or sentence has a high dimensional vector representation (Landauer et al., 1998). We can thereby compare the semantic space as “a huge bag of words” or an area to perform the semantic analysis. In LSA Colorado, we selected “encyclopedia” (general reading) domain as a semantic space which is available on

the LSA Colorado website. This space contains the text from the 30,473 articles and have 60,768 unique terms (Landauer et al., 1998), while in LSA R, the space was created based on the present dataset, the 11 studies with the 215 unique terms. By this, the bag of words in R is much smaller than in LSA Colorado.

Step 2. Projecting items into semantic space

This step aims to calculate the items with the semantic space. Given the q , which is a survey item, vector q is a “word vector” or a numeric value that represents the meaning of a word. Every item is projected into the semantic space as a vector, and it is saved as \vec{q} for another item-to-item comparison, the projecting will run for the total items (Arnulf et al., 2014)

Step 3. Calculating semantic distance (cosine)

Semantic distance can be understood as the cosine of the angle between two items (Walter, Hemachandra, Homberg, Tellex, & Teller, 2014). When comparing two items, the cosine of the angle between the vector representing the terms are compared (Landauer et al., 1998). The rationale is that when the distance between two items is low, it indicates high similarity between the items. On the other hand, if the distance is high, two items tends to be very different. To find similar items to \vec{q} , the vector is then compared against all the items stored inside the semantic space, \vec{q}_n , using the cosine similarity measurement, where n is the total number of stored items (Arnulf, 2014):

$$\text{Similar}(q) = \sum_n^i \cos(\vec{q}, \vec{q}_n)$$

Additional step (LSA R only)

The last step includes visualizing the cosine distance between the scales. This is done by using two functions in R called *plot_wordlist* and *ggplot2* (Günther, Dudschig, & Kaup, 2015). A 2D plot was created from all the scales in the dataset to visualize scale similarities. All scales are clustered based on the semantic relationship, which is similar to an exploratory factor analysis technique.

5.1 Interpretation of cosines

The cosines value range between -1 to +1, where a higher number indicates a higher probability of meaning similarity and a lower cosine refer to a lower probability or

less similarity (Arnulf et al., 2018; Arnulf et al., 2014). A value of 0 indicates orthogonal vectors (e.g. unrelated words or documents), while a value of 1 indicates identical vectors. Although, LSA shows negative cosines, such values cannot be reliably interpreted due to the limitation of detecting positive and negative context (Günther et al., 2015). Although the output of both algorithms will display the same as a cosine value, comparing cosines between LSA Colorado and LSA R can lead to misunderstanding. The semantic spaces or bag of words in these two algorithms come from different sources and have different sizes. Thus, it is not comparable.

6.0 Result

To answer the hypotheses, the results were separated from each algorithm due to the simple reason that the cosines from LSA Colorado and LSA R are not comparable. The results are thereby more understandable to explain separately. The feature of LSA R to visualize data was also desired to answer H1, hence LSA Colorado would be used to test H2.

H1: The scales used in the selected studies can be semantically predicted

Table 2 is adapted from a zero-order correlation table to show the cosine matrix among scales. The result ranges between -.23 to .98, Mean = .24 and *SD* = .30. The highest degree of cosine is between Avoiding and Third-party involvement (.98) while there are several between-scales with the values 0.00 indicating orthogonal vectors or unrelated texts. The result shows that the cosine of COMP and COOP is .62 indicating the highly moderate degree of semantic similarity between scale.

Based on the result from the table 2, to answer the hypothesis, a simulated illustration of the semantic similarity between COOP, COMP and Avoiding scales (figure 1) was created. Avoiding was set as the main scale against the other scales (vectors). As the illustration shows, the cosine between Avoiding and COOP (.23) indicates a low degree of semantic similarity which is lower than the cosine between Avoiding and COMP (.45) indicating a moderate degree. Therefore, the patterns support H1.1; the semantic similarity of Avoiding is closer to COMP than to COOP.

	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
1 Affect-based trust																					
2 Affective conflict																					
3 Agreement seeking behavior																					
4 Altruism																					
5 Avoiding																					
6 Cognition-based trust																					
7 Cognitive conflict																					
8 Competitive approach (COMP)																					
9 Competitive interaction																					
10 Compromising																					
11 Conflict attitudes																					
12 Conscientiousness																					
13 Cooperative approach (COOP)																					
14 Courteous																					
15 Credit worthiness																					
16 Customer-orientation																					
17 Dominating																					
18 Effective practices sharing																					
19 Extra role performance																					
20 Guanxi																					
21 Innovation																					
22 Inrole performance	1.00																				
23 Integrating	-0.04	1.00																			
24 Interdependence	0.38	0.38	1.00																		
25 Interorganizational trust	0.15	0.16	0.13	1.00																	
26 Interpersonal conflict	0.42	0.00	0.40	0.01	1.00																
27 Intra-group trust	0.04	0.48	0.44	0.27	0.41	1.00															
28 Negative emotions	-0.12	-0.10	-0.03	-0.02	0.67	0.42	1.00														
29 Obliging	-0.05	0.86	0.35	0.13	-0.03	0.23	-0.07	1.00													
30 Partnership effectiveness	0.11	-0.23	-0.14	0.03	-0.06	-0.21	-0.05	-0.02	1.00												
31 Political skill Inventory	0.02	0.28	-0.12	-0.11	0.35	0.47	0.38	0.12	0.11	1.00											
32 Productive Conflict	0.32	0.20	0.73	0.21	0.49	0.30	0.01	0.14	0.00	-0.05	1.00										
33 Project performance	0.47	0.07	0.39	0.33	0.22	0.54	0.02	-0.14	-0.20	0.08	0.33	1.00									
34 Relationship conflict	-0.04	0.01	0.07	0.17	0.24	-0.01	0.11	-0.11	0.06	0.13	0.46	0.21	1.00								
35 Task conflict	-0.12	0.01	0.05	0.21	0.33	0.01	0.29	0.00	0.07	0.08	0.50	0.15	0.92	1.00							
36 Task reflexivity	0.69	-0.07	0.68	0.07	0.75	0.20	0.32	0.05	0.08	0.01	0.62	0.34	0.05	0.14	1.00						
37 Team effectiveness	0.89	-0.01	0.57	0.07	0.33	0.07	-0.11	-0.01	0.09	0.03	0.43	0.55	0.04	-0.06	0.75	1.00					
38 Team Coordination	0.56	0.05	0.80	-0.07	0.59	0.15	0.17	0.09	0.00	0.08	0.62	0.26	0.13	0.09	0.87	0.77	1.00				
39 Team performance	0.69	-0.05	0.57	0.00	0.79	0.09	0.17	-0.01	0.00	0.05	0.53	0.13	0.05	0.06	0.85	0.58	0.75	1.00			
40 Transformational leadership	0.52	0.08	0.40	-0.01	0.51	0.12	-0.05	0.06	0.11	0.21	0.45	-0.02	0.16	0.08	0.52	0.38	0.47	0.71	1.00		
41 Third party involvement	0.40	0.04	0.32	-0.03	0.46	0.08	-0.01	0.01	0.04	0.08	0.59	-0.03	-0.02	-0.01	0.41	0.29	0.36	0.57	0.38	1.00	
42 Transaction costs	0.11	-0.01	0.01	0.02	0.12	0.17	-0.03	-0.03	0.03	0.08	0.13	0.25	0.11	0.05	0.05	0.08	-0.02	0.00	0.01	0.08	1.00

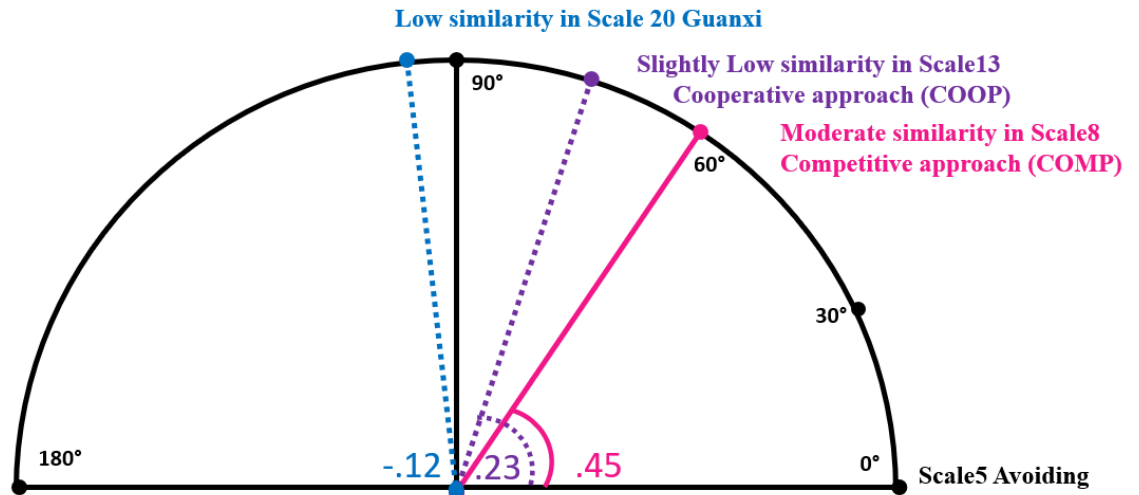


Figure 1. The simulated illustration of semantic similarity of COOP, COMP and Guanxi on Avoiding scale.

The relation between Avoiding with other relevant outcomes were also explored. It was tested against Guanxi (Chinese social connection) which find the cosine only - .12 indicating a low degree of semantic similarity between them. Cosine of other scales which do not show in the illustration such as Partnership effectiveness (.01), Interpersonal conflict (.40) and negative emotion (-.02) for instance.

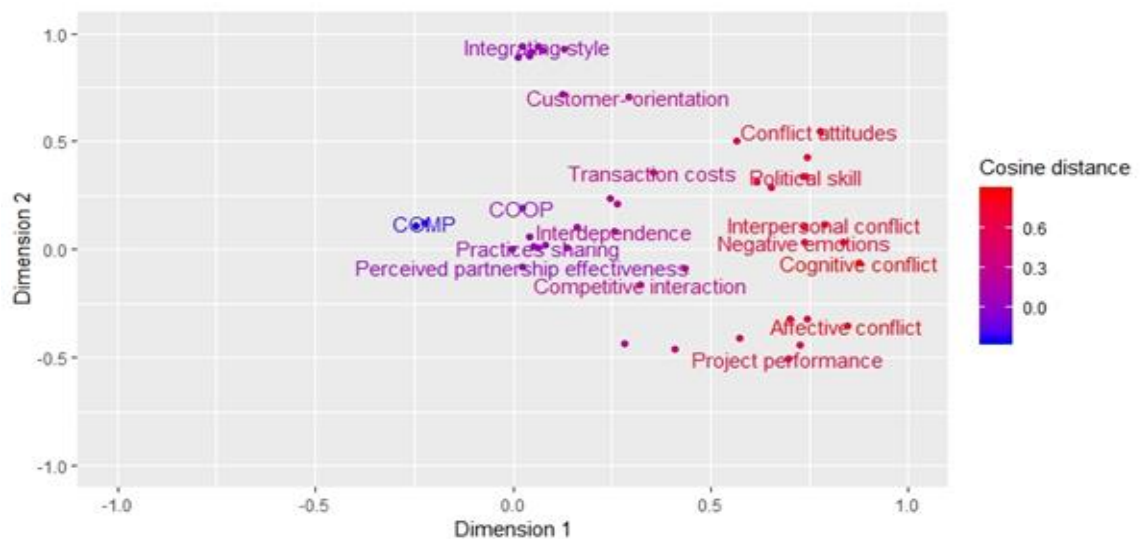


Figure 2. A plot of the semantic similarity among all scales

Figure 2 displays a 2-dimensional plot of the semantic similarity among 42 scales. This plot can be treated as similar to factor analysis where all scales are grouped based on a semantic relationship or cosine distance. The results present roughly two clusters of scales. As the plot shows, cluster 1 includes COOP, Interdependence, Practice sharing and Partnership effectiveness, followed by Competitive interaction. Cluster 2 includes Cognitive conflict, Affective conflict, Interpersonal conflict, Transaction cost and Negative emotion. Regarding COMP, seem like it does not belong to any one of the clusters. Semantic similarity of COOP is closer to other measured scales than COMP, therefore, this empirical result proves H1.2.

Based on the results presented it can be concluded that it supports H1; the scales used in the selected studies can be semantically predicted.

H2: the mediating model from the conflict studies can be explained by semantic patterns.

Of the 11 studies in the dataset, seven studies (1, 4, 6, 7, 8, 9 and 11) used scales from the conflict management approaches by Alper et al. (2000).

These studies were selected to represent the majority of the conflict studies. Regarding the concept, conflict management approaches were combined of two constructs, COOP and COMP. However, since LSA cannot differentiate between positive and negative context, only the relation of COOP was presented to avoid misinterpretation. To illustrate this, LSA cannot detect that COMP would have a negatively semantic relation to team effectiveness or open discussion. The cosine indicates only the degree of semantic similarity, not the direction, so the value between these variables (COOP and COMP) would be positive. Therefore, presenting the result of COMP can be misleading, while the results of the relationships between COOP and other scales are enough to answer the hypothesis.

It was also explored whether the variables position in the model would matter (e.g. an independent variable or a mediator). It is assumed that although the position of COOP changes, the semantic effect would apply the same way. The studies were divided into two groups; 1) the studies that were conducted COOP as an independent variable (study 1, 8, 9 and 10) (figure x) and 2) the studies were COOP is treated as a mediator (study 4, 6 and 7) (figure x).

Table 3. the observed correlations and the correlation predicted by LSA (cosines) between the scales.

Sources of Value		Mediating Model				
Group 1						
1		COOP	→	Intra- Org Trust	→	Partnership Effectiveness
	<i>Correlation</i>		.67		.41	
	<i>Cosines</i>		.64		.61	
		COOP	→	Practice Sharing	→	Partnership Effectiveness
	<i>Correlation</i>		.36		.39	
	<i>Cosines</i>		.54		.65	
8		COOP	→	Productive Conflict	→	Team Effectiveness
	<i>Correlation</i>		.65		.38	
	<i>Cosines</i>		.86		.64	
9		COOP	→	Affect- Based Trust	→	Team Performance
	<i>Correlation</i>		.37		.19	
	<i>Cosines</i>		.67		.61	
		COOP	→	Cognitive- Based Trust	→	Team Performance
	<i>Correlation</i>		.30		.25	
	<i>Cosines</i>		.64		.71	
11		COOP	→	Task Reflexivity	→	In-role Performance
	<i>Correlation</i>		.55		.28	
	<i>Cosines</i>		.60		.60	
		COOP	→	Task Reflexivity	→	Extra-role Performance
	<i>Correlation</i>		.55		.21	
	<i>Cosines</i>		.60		.58	
Group 2						
4		Customer- orientation	→	COOP	→	Credit worthiness
	<i>Correlation</i>		.73		.55	
	<i>Cosines</i>		.71		.61	
6		Guanxi	→	COOP	→	Partnership effectiveness
	<i>Correlation</i>		.22		.35	
	<i>Cosines</i>		.63		.54	
7		TFL	→	COOP	→	Team Coordination
	<i>Correlation</i>		.64		.36	
	<i>Cosines</i>		.54		.58	

Table 3 shows the results of semantic analysis and the studies. In the first column, the sources of value include 1) *the observed correlation* from the studies responded by Chinese respondents to questionnaire surveys translated to Chinese language and 2) *the cosines* between the scales. The cosines represent the correlations predicted by LSA. Across seven studies, the observed correlations ranged from .19 – .73, mean = .42 and SD = 0.165, while the cosines ranged from .54 - .86, mean = .64 and SD = 0.08. The observed correlation shows a wider data distribution than LSA cosines. Due to the limited amount of studies, we cannot analyze statistically if the observed correlations and the correlations predicted by LSA are significantly

similar. However, we can observe from the table that the observed correlations and cosines for the relationships of the independent variables and mediators are more similar than the relationships of the mediators.

The second column is the relational model of each study which contain independent variables, mediator and dependent variables. These patterns were used as a model to test with LSA.

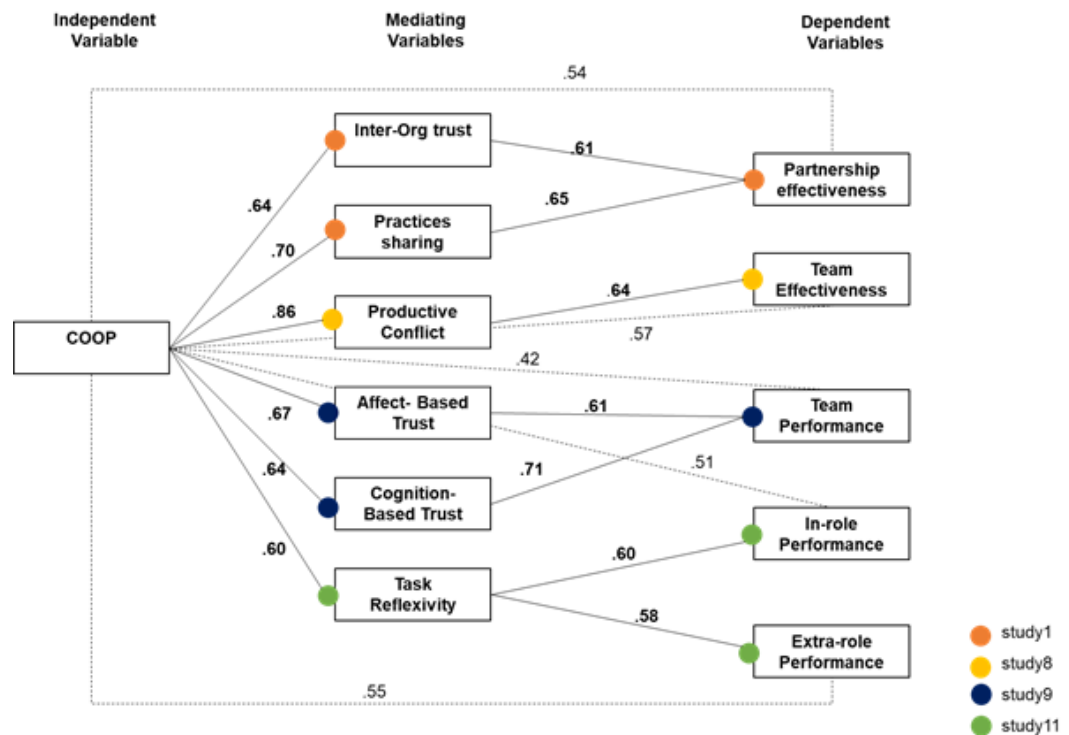


Figure 1. the semantic relation that conducted COOP as an independent variable.

Refer to the first group, four studies (study 1, 8, 9 and 11) have COOP as an independent variable.

Study 1: COOP had a positive effect on partnership effectiveness through inter-organizational trust (trust between departments) and effective practice sharing (Wong et al., 2011). The result found that the cosines from COOP to inter-organizational trust (.64) and practice sharing (.70) are moderately higher than COOP directly to partnership effectiveness (.54).

Study 8: COOP had a positive impact on team effectiveness through productive conflict (G. Chen, Liu, & Tjosvold, 2005). The result found that the cosine from

COOP to productive conflict (.86) is greatly higher than directly to team effectiveness (.64).

Study 9: *COOP had a positive impact on team performance through affect-based trust (social-emotional bond) and cognitive-based trust (task performance) (Hempel et al., 2009).* The result found that the cosines from COOP to affected-based trust (.67) and cognitive-based trust (.64) are greatly higher than COOP directly to team performance (.42).

Study 11: *COOP had a positive relationship with in-role and extra-role performance through task reflexivity. Task reflexivity refers to actions that try to improve work (e.g., seeking feedback, adapting, and so on) (Tjosvold, Hui, & Yu, 2003).* The result found that the cosine from COOP to task reflexivity (.60) higher than COOP to in-role performance (.51) and extra-role performance (.55) to some extent.

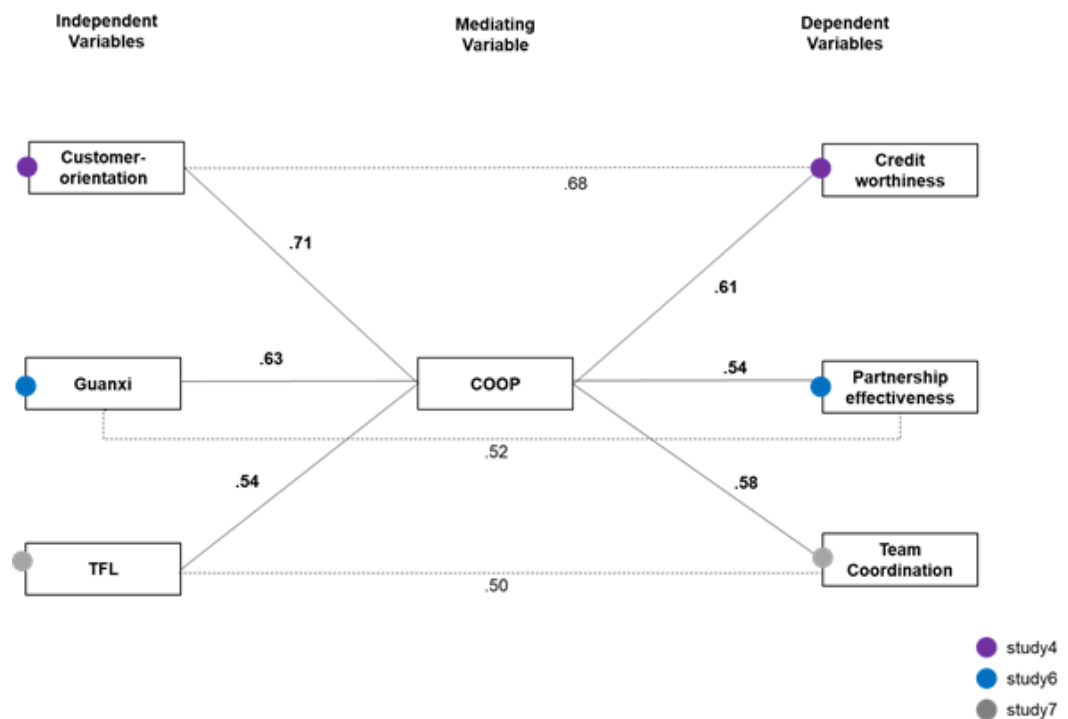


Figure 2. *the semantic relation that conducted COOP as a mediator.*

Regarding the second group, three studies (study 4, 6 and 7) have COOP as a mediator.

Study 4: *Customer-oriented behavior had a positive effect on creditworthiness through COOP. Since this study was conducted in the bank industry, creditworthiness refers to the willingness of a loan department to provide credit to customers (Wong, Lu, Tjosvold, & Yang, 2016).* The result found that the cosine between customer-orientation to COOP (.71) is slightly higher than the relation to creditworthiness directly (.68).

Study 6: *Guanxi had a positive influence on partnership effectiveness through COOP, where guanxi refers to the social connection in the Chinese way (Wong (Wong & Tjosvold, 2010).* The result found that the cosine of guanxi to COOP (.63) is moderately higher than guanxi directly partnership effectiveness (.54).

Study 7: *Transformational leadership behavior (TFL) had a positive impact on team coordination through COOP (Zhan et al., 2011).* The result found that the cosine from TFL to COOP (.54) is slightly higher than directly to team coordination (.50).

Overall, the cosine of COOP to the mediating variables are higher than to the dependent variables in the first group. Similarly, even though COOP is treated as a mediator in the second group, the cosines from the independent variables to mediators are still higher than to the dependent variables. To conclude, the LSA algorithm results can replicate the structural model of the selected conflict studies. The semantic relation of indirect path (the independent variable to the mediators) is closer than direct path (the independent variable to the dependent variable). Therefore, the finding support H2 that the mediating model can be predicted semantically.

7.0 Discussion

By using semantic algorithms (LSA Colorado and LSA R) to cross-cultural conflict studies in the Chinese context, it is possible to explain the semantic effects towards the scales and the whole structural models significantly. Although the scales used in the selected studies were based on the Chinese language responded by the

Chinese population and the inputs conducted by the semantic algorithms were English, the patterns of relations between scales show the same.

Regarding H1, the results confirm that the scales used in the cross-cultural conflict studies are semantically predicted. First of all, several studies found that avoiding conflict predicts competition, which makes this conflict handling approach become a part of COOP style (Deutsch, 1949; Rahim, 1983). Our finding points out that this may be a result of the semantic effect. The results predicted by LSA show that the semantic distance of Avoiding is closer to COMP than to COOP. This implies that the scales used in conflict studies potentially determines the directions prior to conducting the research by language overlapping.

Furthermore, the 2D plot from LSA R also shows a tight cluster between COOP and other relevant scales. As explained in the result section, COOP shows a high possibility of semantic similar to other scales such as Partnership effectiveness, Interdependence and Effectiveness sharing and Conflict interaction. The position of COOP in the relationship among these scales is closer than COMP. Interestingly, some of the other scales that have a tight distance to COOP are dependent variables (e.g. partnership effectiveness) which highlights that semantic relation influences beyond the intra-scales. Although, some results are still questionable, e.g. the relationship between COOP to competitive interaction that is closer than COMP, which there is not a clear solution to explain. However, it was found that by grouping the scales based on the cosine distance, the results give valuable insight. The cluster 1 contains the scales used in the studies that applied “Cooperation and Competition theory by Deutsch (1949), while the cluster 2 covers the scales used in theory developed by Jehn (1995, 1997) and colleagues, e.g. Interpersonal Conflict (Jehn, 1995) and Affective and Cognitive conflict (Jehn (Jehn, 1997). Two clusters show a rough line between different theories, even though they measure the same topic. It is also noticed that the semantic effect might also predict a construct. This idea supported by Kjell et al. (2018)’s study that natural language by digital semantic measures can *measure, differentiate, and describe* constructs. The researchers used a more advanced version of LSA and found that it can cluster different mental states into different constructs (e.g. sad, happy, upset, and so on).

(Kjell et al., 2018). Nevertheless, the findings are still in a preliminary stage and the cluster analysis should be investigated further with firm back-up theories.

The semantic relation between COOP and COMP should also be mentioned. The value shows a relatively high similarity (.62) (table 2.). Although these two constructs seem to be opposite, the cosine turns out a positive value. This is not surprising since both measure the same thing to assess how people have an attitude towards goals and how they respond to conflict (Deutsch, 1973). These scales also developed from the same theory; hence, the overlapping meaning between them is understandable. However, what is more interesting is that COMP is a standalone scale that has a negative cosine (-) among the group (figure2.). This result indicates the distant relation of COMP from the overall scales. Nevertheless, the problem with signs should be re-emphasized here, the interpretation is not firmly sure on the negative value since the current capability of LSA R and LSA Colorado limits to only the relationship and not the direction of terms (Günther et al., 2015) A further investigation is needed with a larger size of semantic space of LSA R or other advance language analyzing tools; the result then may confirm it better. Another relationship that needs to be pointed out is between Avoiding and Third-party involvement. Both scales show a very high similarity, almost identical (.98) (table 2). Considering a practical approach, third- party can be perceived as a technique of avoiding approach strategy, especially in the Asian context where it is used to buffer conflict effects (Giebels & Yang, 2009; Morris et al., 1998).

Regarding H2, LSA was able to re-create the original empirical studies which confirm that language relationships can predict the mediational relationships of conflict scales. Unfortunately, it cannot be concluded that the cosines from LSA can replicate the observed correlations from the studies, but the algorithm shows that the structural model from the selected studies can be. Whether the pattern of semantic relation would be the same if the position of COOP in model changed was also tested. The results reveal that regardless of what scales it is, the semantic relation of an indirect effect (an independent variable to a mediator is always higher than a direct effect (an independent variable to the dependent variable).

Overall, the results align with previous studies; the semantic relationships do not only determine relationships within and between scales, but also the pattern of relationships that characterizes the whole model that study on intrinsic motivation (Arnulf et al., 2018) and transformational leadership (Arnulf et al., 2014) exposures the same. This brings up the idea that it does not matter which scales that were used to measure (conflict management, leadership, motivation, or so on) semantic effect always influence on all topics of survey-based studies.

Most of the empirical studies on cross-cultural conflicts were performed based on the western cultural background, while the conflict studies under the native Chinese standpoint were limited. Understandably, the global workforce movement shapes a research field in this way. However, instead of understanding Chinese working culture through their original eyes, many scholars and practitioners decided to adopt the western concept with the translated scales into the local culture and claim that the result for both cultures shows the same. As discussed earlier, the concept of conflict is universal across cultures, but the approach to interact and handle conflicts differs from culture to culture (Chen & Starosta, 1997). This thesis was able to answer our research question that the current practice of cross-cultural conflict studies is insensitive to cultural differences.

As (Arnulf, 2019) mentioned, the digital language algorithms, which know nothing about samples or cultures, can predict the same results as studies by surveys. It can be implied that regardless of locations or sample groups, the results will reflect the same. Questionnaire survey can be only an instrument to serve the semantic structures rather than capturing the real cultural differences. It is believed that the results are not limited only to the conflict studies, but also other cross-cultural topics within the field of organizational behavior.

By turning the results into practical values, two implications are proposed,

1. *The cross-cultural study needs more objective statistic:* Spector and Brannick (1995) proposed that the most effective way to overcome methodological weaknesses is to test ideas with different methods. Not only the semantic effects, but the flaw with translation can be limited if the research methodology is complemented (not replaced) by empirical data.

Take our selected studies, for instance, the majority used self-rating questionnaires, while some of the studies combined self- with questionnaires rated by others (managers or customers). However, just a few studies used empirical data. The outcomes would be less contaminated by semantic effect if some constructs measured by actual information rather than employee surveys rating, e.g. the number of transaction cost, customer satisfaction score (to measure customer-orientation), performance ratings/ KPI achievement (to measure team performance), the numbers of implemented innovative ideas/ activities (to measure innovation) and so on.

2. *Call for empirical studies developed from local backgrounds:* The conceptual framework developed in individual cultures may not provide an adequate description for conflict-related phenomenon in China (Zhang & Zhang, 2013). To promote a comprehensive viewpoint, conceptual theories developed from local philosophy should be tested by measurement to ensure that it is valid within the cultures. This can be a solution to expand understanding across cultures also capture truly the cultural differences. Additionally, scales under local theories can be developed to compare with the translated scales to see whether semantic similarity will still make an impact or not.

7.1 Limitations and future research

As the semantic algorithm is a relatively unconventional approach in the organizational behavior field, the study is not without its limits. The boundary and key suggestions for future research can be pointed out to four topics 1) the dataset, 2) the problem of signs of LSA algorithm 3) the semantic space of LSA R and 4) the topic used in the study.

Regarding the dataset, around one hundred articles within cross-cultural conflict studies, eleven studies ended up being picked as not so many articles provided the full versions of questions. Even though the dataset was adequate for this study, the size of the dataset did not allow the performance of a statistical analysis further, e.g. to compare the observed correlation from study and the correlation predicted by

LSA at a significant level. Besides, caution for future research is that inputs need to be cleaned carefully since LSA algorithms can calculate it wrongly. Unrelated and repeated words should be removed (e.g. starting sentences with our departments, our functions, we believe that, and so on).

Another issue is the problem of signs, as stated several that LSA lacks the capability to detect context. However, knowing this limitation beforehand helped us handling data well and were not surprised by uninterpreted results Besides this, a negative cosine value from LSA is still questionable. Technically, one can apply the LSA R developer's technique for the future research by setting a negative cosine to 0 in R script (Günther et al., 2015). This procedure aims to avoid confusion and focus only on the explanation that 0 means unrelated texts, and 1 means identical matching.

The semantic space in LSA R was not big enough. It is possible that if the space is more extensive, the outcomes would reflect closer to reality and may differ from what was found. However, this should not be seen as a limitation but rather improving for future research. It is therefore suggested to include the questionnaire items from diverse topics within organizational behavior field to create a larger semantic space.

Besides the methodology, the topic selected for this research is the last issue we want to highlight. Some topics that are greatly affected by cultural differences should be investigated further in terms of semantic viewpoint (e.g. leadership, communication, decision making, job engagement and so on). Cross-cultural conflict study is a good example showing that gap between real phenomena and finding is largely exist which is one of the researcher's duties to fix them.

8.0 Conclusion

This study aims to explore cross-cultural conflict studies in China through semantic algorithms. The way people handle conflicts differ from one culture to another culture, but why are the cross-cultural research findings showing the same results for both Asian and Western cultures? This raised the question that the current practices of cross-cultural studies which heavily rely on survey-based method, may not be capable enough to capture the real cultural differences. Two digital language

algorithms, LSA Colorado and LSA R, were served as an instrument to investigate 42 scales from 11 published cross-cultural studies. The results revealed that even the original scales used in the actual survey were in Chinese, and the scales used as LSA inputs were in English, the result shows the same patterns. Hence, two purposes were achieved; firstly, semantic algorithms can predict scales used in the selected studies. Secondly, the mediating model from the selected studies can be explained by semantic similarities.

To conclude, regardless of locations or sample groups, the results always reflect the same, since surveys only can answer the semantic relation of the sentences, but not detect the cultural differences. No matter what the scales are (conflict management, leadership or other scales within organizational behavior), the semantic effects would always influence the results to some extent. It is proposed that the cross-cultural research methodology should be changed. Objective statistical data can be one option to complemented self-rating surveys. As well as more empirical studies developed from local cultural backgrounds. These solutions may help broaden the understanding across cultures and truly explain cultural differences.

Appendix

LSA R script

```

#=====
===
# Create semantic space using lsa package
#=====
===

library(readxl)
library(lsa)
library(quanteda)
library(LSAfun)
library(dplyr)
library(ggplot2)
library(ggrepel)

setwd("C:/Users/a1310017/Desktop/Local R/Semantics/")
scaleData <- read_excel("C:/Users/a1310017/Desktop/Local
R/Semantics/TMTresearchItems_New.xlsx", sheet = 1)

# Tokenize the texts based on abstracts
words <- tokens(as.character(scaleData$ItemText), remove_punct = TRUE,
remove_hyphens = TRUE, remove_numbers = TRUE)
# Construct a document-feature matrix
myMatrix <- dfm(words, groups = scaleData$ScaleName, tolower = TRUE,
remove = stopwords('english'), stem = TRUE)
#View(myMatrix[1:50,1:50])

# Calculates a latent semantic space from a given dfm. LSA combines the classical
vector space model
# with a Singular Value Decomposition (SVD), a two-mode factor analysis.
# Identifies a 'good' number of singular values for the dimensionality reduction.

LSAspace <- lsa(myMatrix, dims = dimcalc_share(share=0.4))
#LSAspace <- lsa(myMatrix, dims = 8)

tkMatrix <- as.matrix(LSAspace$tk)
dkMatrix <- as.matrix(LSAspace$dk)

```

```

# Similarity of words
lsaMatrix <- diag(LSAspace$sk) %*% t(LSAspace$dk)
wordSim <- cosine(lsaMatrix)

#View(wordSim[1:50, 1:50])

# Similarity of scales
lsaMatrix2 <- diag(LSAspace$sk) %*% t(LSAspace$tk)
scaleSim2 <- cosine(lsaMatrix2)

scaleSim2[upper.tri(scaleSim2)] <- ""
scaleSim2 <- as.data.frame(scaleSim2)

# Write to csv
write.csv(scaleSim2, "scaleSimilarityMatrix.csv")

#=====
===
# Visualize
#=====
===

# Plot wordlist based on LSA space and cosine distance
scaleList <- unique(scaleData$ScaleName)
scaleListData <- plot_wordlist(scaleList, method = "PCA", dims = 2, tvectors =
LSAspace$tk)
# Method PCA or MDS
scaleListData$name <- rownames(scaleListData)

ggplot(scaleListData, aes(x = x, y = y, color = x)) +
  geom_point() +
  scale_color_gradient(low="blue", high="red") +
  geom_text_repel(aes(label = name, color = x), check_overlap = T) +
  scale_x_continuous(name = "Dimension 1", limits = c(-1, 1)) +
  scale_y_continuous(name = "Dimension 2", limits = c(-1, 1)) +
  labs(color = "Cosine distance")

# Based on word frequencies (Quanteda package)
toks <- words %>%
  tokens(remove_punct = TRUE) %>%
  tokens_tolower() %>%
  tokens_remove(pattern = stopwords("english"), padding = FALSE)

```

```
fcmat <- fcm(toks, context = "window", tri = FALSE)
feat <- names(topfeatures(myMatrix, 30))
fcm_select(fcmat, pattern = feat) %>%
  textplot_network(min_freq = 0.5)

# Word cloud
textplot_wordcloud(myMatrix, rotation = 0.25,
  color = rev(RColorBrewer::brewer.pal(10, "RdBu")))
```

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