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# Construal Level Research in Decision Making: Analysis and Pushing Forward the Debate Using Bibliometric Review and Thematic Analysis

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## ABSTRACT

This study examines the extant literature on Construal Level Theory through bibliometric analysis that traces the path of research from 1998 to November 2019. It uses the Scopus database to identify emerging trends, seminal and most-cited papers, authors, universities, and countries that contributed to the development of the theory. A total of 680 papers from 1445 authors, were published in as many as 322 journals. The results indicate that 'Journal of Experimental Social Psychology,' 'Journal of Personality and Social Psychology,' and 'Personality and Social Psychology Bulletin,' were the three most productive sources of knowledge for this theory. The results show that over time, the discussion has progressed from theory to application in different areas of decision sciences, psychology, and management with a recent trend towards application in sustainability. This is the first literature review that has been conducted on the Construal Level Theory using bibliometric analysis. This study attempts to describe, explore possibilities, and provide a roadmap for future research in this field.

## KEYWORDS

Construal Level Theory, Decision Making, Bibliometric Analysis, Psychological distance, Abstraction

## INTRODUCTION

Construal Level Theory (CLT) is one of the important theories in consumer decision making. It helps to make an appropriate decision on the basis of immediacy. When we think about something that is here, and now, we are more likely to thoroughly process the details. On the other hand, when we think about something that is distant from here and now, we are more likely to process it in an abstract form (Liberman & Trope, 2003). This simple bifurcation in information processing has implications for explaining and predicting a wide range of human behavior. CLT is an important discovery in social psychology and has immense implications for understanding the decision-making process. This theory has capability to offer both parsimonious explanations and novel predictions about how and why distance alters perceptions of distributed group members while another similar type of theories such as computer-mediated communication and social identity unable to recognize similar patterns (Wilson et al., 2013). Another advantage of this theory is that it enriches other important theories of consumer behavior like Theory of Planned Behavior (TPB) (Ajzen, 1985) and Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) by acting as a moderator. CLT explains how factors within TPB vary with changes in construal level (Deng et al., 2017). It has been shown that temporal frame affects the salient behavioral beliefs (Lutchyn & Yzer, 2011). On the other hand, CLT also acts as a moderator for TRA (Sweeney, 2016). The research around this theory has been expanding over the years, from theoretical

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developments to its application in different areas. The theory has been widely used to study multidisciplinary areas like judgment and decision making, consumer behavior, sociology, organizational behavior, individual behavior, finance, and health. It is evident from the SCOPUS database that more than 800 articles have been published in last decades with an increasing frequency every year across different domain.

One of the major challenges for any researcher is to understand how the theory has evolved over time. An increasing trend of publications suggests that there is a need to study the current body of knowledge and provide missing themes for future research directions. CLT comprises different constructs, and all are equally important (Lieberman et al., 2007). However, most of the published papers have considered only a few of the constructs (Soderberg et al., 2015). It is important to understand best performing authors and journals to help in the decision regarding potential collaborators and potential journal outlets. Similarly, a publication overview of institutions and countries could throw some light on the network of research and concentration of outputs. Another aspect under scrutiny could be the longitudinal developments in this area, which can help researchers in finding the research gaps to be pursued. It is also important to identify collaborators for research work in CLT.

Furthermore, a longitudinal visualization of research themes can help to identify some upcoming research areas. However, none of the authors have done an extensive literature review, particularly in the context of network visualizations. To bridge this gap, we have carried out this study. We propose the following research questions for this study:

**RQ1: What are the key areas of research in CLT literature?** It would highlight the key areas of study within and outside the confines of social psychology.

**RQ2: How has the publication performance in CLT with respect to authors, institutions, journals, and countries been?** The publication performance would reveal the top performers as well as the structure of the network between them.

**RQ3: How have authors used different psychological distances?** This study could divulge whether some aspects received more attention than others. Soderberg et al. (2015) found that hypotheticality was less used compared to other psychological distances.

**RQ4: Are there some patterns in the scholarly discussions around CLT?** Bibliometric analysis can demonstrate the network, flow of ideas, and collaboration of different authors, institutions, journals, and countries.

**RQ5: How have the discussions changed over time?** The upcoming topics and ideas for future research elucidated in this discussion could be embedded in the way past research has evolved.

The remainder of the article is organized as follows: Firstly, we introduce CLT. Thereafter we discuss the methodology employed in this study. Thereafter we discuss the results of the bibliometric analysis while exploring the publication performance in CLT. We present discussion, future research directions, and limitations in second last section. Finally, a conclusion of the review is provided.

## CONSTRUAL LEVEL THEORY

Construal Level Theory is a unifying theory that connects mental abstraction to the proximity of the context. The proximity to a context suggests how near or far a person is from that context. The proximity of a person to a decision context is conceptualized as the psychological distance. The first discovery in this regard was the theorizing of 'temporal distance' (Lieberman & Trope, 1998). Temporal distance refers to how distant the context is placed from the decision-maker. An event that occurred

in the past or would occur in the future is defined as a ‘temporally distant’ event. Similarly, spatial distance, social distance, and hypotheticality also affect mental abstraction. Any context that is psychologically distant would lead to an abstracted level of thinking, while events that are psychologically nearer would lead to a concrete level of thinking (Trope et al., 2007). It was also found that the decision-makers think more about the desirability of distant events while they think more about the feasibility of the event that is temporally nearer (Liberman & Trope, 1998). There is an advantage of the ability to construct an abstract representation. This ability has helped us to develop skills for developing mental models, language, and self-control (Soderberg et al., 2015). In addition to this, it also helped us to plan for the future and visualize counterfactuals.

Construal Level bifurcation can simplify and analyze a lot of decision contexts. Lower construal level can induce a higher sense of risk in individuals (Chandran & Menon, 2004). Similarly, Nan (2007) found that gains were perceived to be stronger for socially distant, while losses were perceived to be stronger for socially nearer events. Another application of the construal level has been in finding what kind of recommendations work better. It was found that higher construal level use leads to a higher perception of expertise (Reyt et al., 2016).

## METHODS

A large amount of bibliographic data on the subject that makes it difficult for researchers to develop an overview necessitates a need for review and bibliometric analysis (Nerur et al., 2016) of the scholarly work around CLT. This topic can be considered to be a mature one owing to its diverse application and representation in multiple reputed journals. Bibliometrics is the research technique that analyses the bibliographic material quantitatively using the paper’s title, author names, and affiliations, keywords, publications, etc. This approach analyses the literature in great detail, revealing the patterns over time, showcasing the sources of research, and most importantly, evaluating the network between different authors, universities, etc. (Nerur et al., 2016). Given the nature of the bibliometric analysis, it scores over systematic literature review or meta-analysis. On a comparative basis, the bibliometric technique is better as the paper selection, and analysis criteria are objective, thus preventing any biases from creeping into the research. Bibliometric analysis is an appropriate method to objectively process a vast amount of literature where the publication counts and impact are considered (Narin et al., 1994).

Bibliometric studies are applied in several areas like Business (De Bakker et al., 2005), Operations (Ferreira, 2018; Mishra et al., 2018), Information systems (Baldwin et al., 2018; Muhuri et al., 2019) and Marketing (Galvagno & Dalli, 2014). Several journals such as Personality and Social Psychology Review (Ellemers et al., 2019), Journal of Business Research (Vanhalala et al., 2020), Journal of Consumer Psychology (Baumgartner, 2010), and European Journal of Social Psychology (van Leeuwen, 2013) have published bibliometric-based studies.

We chose bibliometric data from Scopus database, the largest citation and abstract database of scientific peer-review literature that consists of more than 23,000 titles from international publishers that ensure quality, completeness, and reliability of the data (Harzing & Alakangas, 2016) was extracted for the time period between 1998 and November 2019. The keywords used in the search were [TITLE-ABS-KEY (“construal level theory”)]. All the data was collected by the authors and downloaded in the CSV format. We have used the attributes as: author names, title of the paper, year of publication, source name, citation count, affiliations, abstract, keywords, and references. The software counts root words only. However, there is an option to add a thesaurus with root and stem words like hypothetical and hypotheticality. We created a thesaurus of CLT terms. Further, we added variations in university names to consolidate the root and stem words.

In order to further improve the quality of our bibliometric review, we used a four-step procedure for this study. First, an initial set of bibliometric data was collected from the SCOPUS database. Then, we tabulated a list of top 10 authors as per the total number of citations. In the third stage, we contacted the top authors for completeness of the papers in the bibliometric data. We made some modifications to the search criteria based upon the feedback received. This helped to capture some missing papers that were not captured through our search. Following their suggestion, the inclusion criteria were broadened to include ‘psychological distance’ and its four dimensions: ‘temporal distance,’ ‘social distance,’ ‘spatial distance’ and ‘hypotheticality’ to the title, abstract, and the author keywords designated by (TITLE-ABS-KEY) in the search criteria. The keywords used in the revised search were [ TITLE-ABS-KEY (“construal level theory” OR ( ( abstract OR concrete ) AND( "temporal distance” OR “psychological distance” OR “hypotheticality” OR “social distance”)))]. This gave us a new bibliometric file, which was again cross-checked and finalized. This gave us an initial set of 809 documents at the end of the fourth step.

This bibliometric file was subsequently used for quantitatively and qualitatively analyzed. On these 809 documents, we applied the first filtering criteria to select only the research articles and review papers and excluded books, book chapters, conference papers, conference reviews, editorials, book reviews, notes, erratum, and letters. We followed these filtering criteria as per the contemporary bibliometric method used by other papers like Baldwin et al. (2018) and Mishra et al. (2018). This filtering enables the selection of appropriate literary contributions and filters out works like letters, erratum, and books.

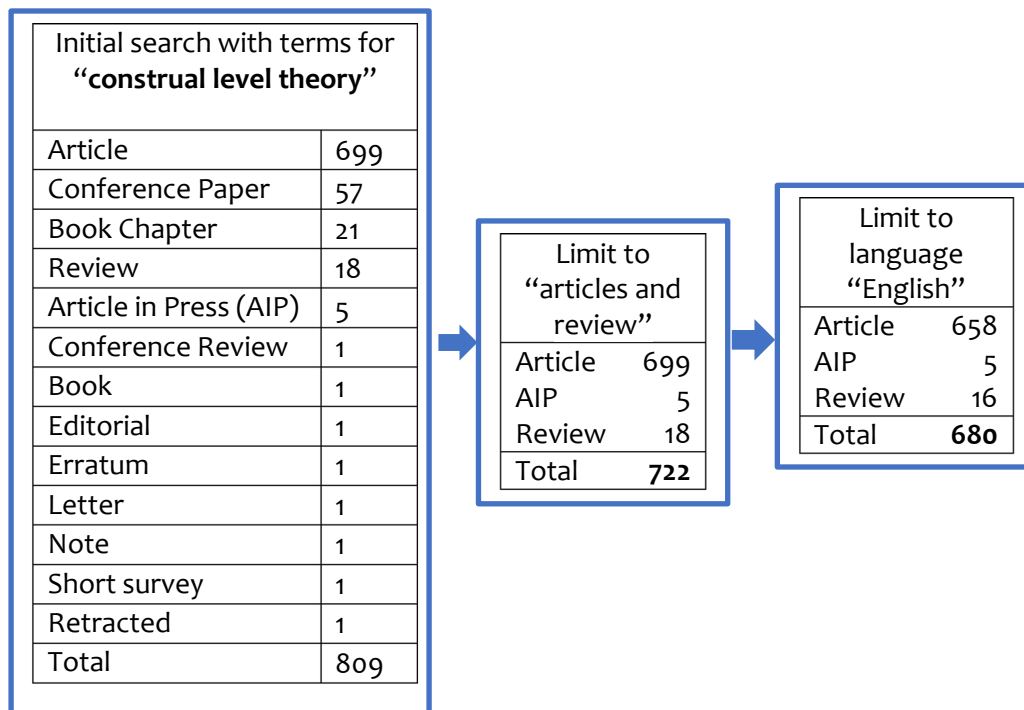


Figure 1: Literature search and filtering criteria

We then analyzed the bibliometric data using Visualization of Similarities (VOS) viewer version 1.6.9 software (Van Eck & Waltman, 2011). VOS viewer is among the most popular software tools for building and depicting networks based on bibliometric data, was primarily used for this study. This analysis demonstrates the network of keywords, publications, authors, organizations, journals, and countries

through the use of bibliometric coupling (Merigó et al., 2015). Additionally, we used Microsoft Excel 2019 and R (R is open-source software).

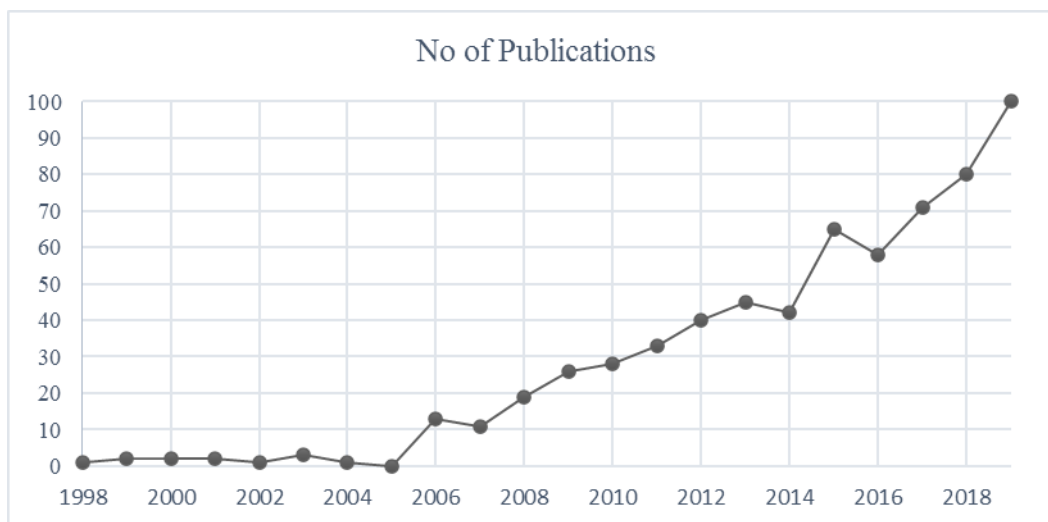
Some data filtering and transformations were done using Microsoft Excel 2019. We used Excel to generate certain derived bibliometric indicators like the total citations (TC), the total number of publications (TP), TC/TP, H-index, Citations per publication (CP), and Citation thresholds like 1, 5, 10, 20 and 50. The citation thresholds are used to identify the level of influence of a journal based on citation of the papers those that at least have received one (Martínez-López et al., 2020). We have used this threshold for table 3.

These metrics are further utilized to compare the publications. We used R along with ‘tm’ and ‘wordcloud2’ packages for word-cloud analysis. We used the following text analysis packages in R: ‘tm’ for text mining and ‘wordcloud2’ to generate a word cloud.

## RESULTS

The publication and citation trends for CLT, the most influential papers, the leading sources, authors, institutions, and countries are summarized and discussed in the following sub-sections, followed by a deep dive into potential possibilities of how the theory has been used in different areas of research. The metrics for bibliometric analysis are drawn from the SCOPUS database in the csv file. We have defined several parameters for the analysis such as total publications, and total citations. One author’s total publications (TP) is a measure of the productivity; total citations (TC) is a measure of impact; the citations per paper (TC/TP) is a measure of value of the papers (Li & Ho, 2008). Top author ranking has been populated based on the number of papers. This is one of the most common measures of productivity used for bibliometric analysis.

### Publications and Citation Trends



**Figure 2:** Publication trend for CLT (1998 to November 2019)

The publication trend of CLT is shown in Figure 2. The original theory was published in 1998 in the paper, “The Role of Feasibility and Desirability Considerations in Near and Distant Future Decisions: A Test of Temporal Construal Theory” (Liberman & Trope, 1998). The publication trend was stable in the period 1998–2005. Another important paper, “Temporal Construal” (Trope & Liberman, 2003), gave

an impetus to subsequent research in the field. A steady upward trend of the publications can be seen after the year 2005, which suggests a consistent increase in interest in research on the subject over time. It confirms there is ample scope for examining key developments and emergent themes for future research.

### **An Overview of the Top Authors, Institutions, and Countries in CLT Literature**

Table 1 presents the top-performing authors, institutions, and countries that have played a pivotal role in CLT research. R signifies the rank in terms of TP. Yaacov Trope and Nira Liberman may have propagated this theory, but the work of authors like Fujita K and Wakslak C.J is no less exemplary. Among universities, New York University, USA and Tel Aviv University, Israel together account for nearly 20% of the publications.

**Table 1:** Top 15 Countries, Journals and Authors

R	Author	TP	Journal	TP	Country	TP	Institutions	TP
1	Yaacov Trope	53	Journal of Experimental Social Psychology	43	United States	320	New York University, USA	73
2	Nira Liberman	40	Journal Of Personality And Social Psychology	28	Israel	67	Tel Aviv University, Israel	61
3	Fujita K.	15	Personality And Social Psychology Bulletin	28	China	58	University of Southern California, United States	22
4	Wakslak C.J	15	Journal Of Consumer Psychology	14	Germany	50	University of Texas at Austin, USA	21
5	Förster J.	10	Psychological Science	14	Canada	49	Ohio State University, USA	19
6	Henderson M.D.	9	Journal Of Experimental Psychology: General	13	United Kingdom	49	Yale University, USA	14
7	Eyal T.	7	Plos One	12	Netherlands	48	University of Florida, USA	14
8	Kim DH	7	Journal Of Consumer Research	11	South Korea	34	University of California, USA	13
9	Stephan E.	7	European Journal Of Social Psychology	10	Australia	29	University of Amsterdam, Netherlands	12

10	Hansen J	6	Frontiers In Psychology	10	France	20	Cornell University, USA	11
11	Angerström J.	6	Social Behavior And Personality	10	Sweden	16	Monash University, Australia	10
12	Tolor A.	6	Journal Of Business Research	9	Taiwan	16	University of Haifa, Israel	8
13	Kim K.	6	Social Psychological And Personality Science	9	Belgium	15	Bar-Ilan University, Israel	8
14	Kim H.	6	Journal Of Business Ethics	8	Italy	15	Tsinghua University, China	8
15	Rim S.	5	Lecture Notes In Computer Science	7	Hong Kong	13	Northwestern University, USA	8

### Influential Papers

A total of 15 most-cited papers with more than 200 citations are listed in Table 2. An abstraction of reality with a focus on only relevant details is elemental in the development of language, cognition, and self-control. While this was studied earlier, it is CLT that is a unifying theory that explains it (Soderberg et al., 2015). The first paper that initiated the development of CLT essentially proposed that time had an impact on feasibility and desirability (Liberman & Trope, 1998). Temporal distance to imagined future events modulates one's evaluative representation of them such that the greater the distance, the more likely the event is to be conceptualized in terms of a few abstract features. This mechanism divorces one cognitively from the reality of likely undesirable eventualities (Trope & Liberman, 2003). Time is not the only factor that influences psychological distance. An event can be psychologically removed from one's self in different dimensions – in time, space, social distance, and hypotheticality. These other dimensions were added to CLT in the paper, 'Construal-Level Theory of Psychological Distance' (Trope & Liberman, 2010). This paper provided the final theoretical stand on the core aspects of CLT and is the highest-cited paper with 1,639 citations. Other papers have applied and extended the original research to different areas. The impact of CLT on representation, prediction, evaluation of consumer behavior has been discussed by Trope et al. (2007). Yet another influential paper, 'The Psychology of Transcending Here and Now' (Liberman & Trope, 2008), offers a lucid explanation for the abstraction of psychologically distant contexts.

The common pattern linking the top-cited papers is that all of them are theory development papers. Other papers have extended the theory and looked at different application areas like social psychology and marketing. These papers have helped elicit a discussion on behavioral aspects of Social Sciences using CLT.



**Table 2:** Top 15 Influential papers

R	Authors	Title	Year	Source title	Cites
1	Trope Y., Liberman N.	Construal-Level Theory of Psychological Distance	2010	Psychological Review	1639
2	Trope Y., Liberman N.	Temporal Construal	2003	Psychological Review	1568
3	Liberman N., Trope Y.	The Role of Feasibility and Desirability Considerations in Near and Distant Future Decisions: A Test of Temporal Construal Theory	1998	Journal of Personality and Social Psychology	973
4	Trope Y., Liberman N., Wakslak C.	Construal levels and psychological distance: Effects on representation, prediction, evaluation, and behavior	2007	Journal of Consumer Psychology	512
5	Liberman N., Trope Y.	The psychology of transcending the here and now	2008	Science	432
6	Trope Y., Liberman N.	Temporal construal and time-dependent changes in preference	2000	Journal of Personality and Social Psychology	424
7	Liberman N., Sagristano M.D., Trope Y.	The effect of temporal distance on level of mental construal	2002	Journal of Experimental Social Psychology	413
8	Smith P.K., Trope Y.	You focus on the forest when you're in charge of the trees: Power priming and abstract information processing	2006	Journal of Personality and Social Psychology	394
9	Spence A., Poortinga W., Pidgeon N.	The Psychological Distance of Climate Change	2012	Psychological Science	321
10	Fujita K., Henderson M.D., Eng J., Trope Y., Liberman N.	Spatial distance and mental construal of social events	2006	Psychological Science	291
11	Förster J., Friedman R.S., Liberman N.	Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition	2004	Journal of Personality and Social Psychology	286

12	Liviatan I., Trope Y., Liberman N.	Interpersonal similarity as a social distance dimension: Implications for perception of others' actions	2008	Journal of Experimental Social Psychology	232
13	Ijzerman H., Semin G.R.	The thermometer of social relations: Mapping social proximity on temperature	2009	Psychological Science	216
14	Wakslak C.J., Trope Y., Liberman N., Alony R.	Seeing the forest when entry is unlikely: Probability and the mental representation of events	2006	Journal of Experimental Psychology: General	203
15	Williams L.E., Bargh J.A.	Keeping one's distance: The influence of spatial distance cues on affect and evaluation: Research article	2008	Psychological Science	200

### Journals as Leading Sources

CLT is a psychological phenomenon, and this is amply demonstrated by the fact that the major sources of knowledge in this domain are journals of Psychology like 'Journal of Experimental Social Psychology,' 'Journal of Personality and Social Psychology,' and 'Personality and Social Psychology Bulletin.' Journals like 'Journal of Consumer Psychology' and 'Journal of Consumer Research' from the field of marketing are also among the top sources along with those from the area of management like 'Journal of Business Research' and 'Journal of Business Ethics.'

The criterion for the impact factor of the journal can be h-index and TC/TP. These indicators strongly indicate that the high-performing journals that serve as sources of knowledge in the Construal Level Theory. We see that in terms of the influence of the research output, the trend does not follow the same as does the volume of output. In terms of the h-index, the leading journals are 'Journal of Experimental Social Psychology,' 'Journal of Personality and Social Psychology,' 'Personality and Social Psychology Bulletin,' and 'Journal of Consumer Research.' The best journal, according to the TC/TP metric is 'Psychological Science' while 'Journal of Personality and Social Psychology' is a close second along with 'Journal of Consumer Psychology.'

**Table 3:** Citation structure of top ten productive journals on CLT

Journal	TP	TC	H	TC/TP	≥50	≥20	≥10	≥5	≥1
Journal of Experimental Social Psychology	43	1953	22	45	9	23	28	36	41
Journal of Personality And Social Psychology	28	2245	22	80	16	23	25	27	29
Personality And Social Psychology Bulletin	28	647	13	23	3	8	15	20	22

Journal of Consumer Psychology	14	1121	11	80	6	11	11	11	13
Psychological Science	14	1140	12	81	8	12	15	15	15
Journal of Experimental Psychology: General	13	923	12	71	9	23	28	36	41
Plos One	12	49	4	4	0	0	1	4	9
Journal of Consumer Research	11	545	10	50	6	9	10	10	11
European Journal of Social Psychology	10	156	6	16	1	2	5	6	10
Frontiers In Psychology	10	12	2	1	0	0	0	0	6

**Abbreviations:** TP and TC = Total papers and citations; H=h-index, TC/TP=Average citation per paper;  $\geq 50$ ,  $\geq 20$ ,  $\geq 10$ ,  $\geq 5$ ,  $\geq 1$  = Number of papers with equal or more than 50, 20, 10, 5 and 1 citations

### Bibliometric Network Analysis

Networks are one of the powerful tools to visualize the bibliometric data. Our unit of analysis are entities like authors, institutions, journals, and countries. In order to clean up spelling differences and root and stem words, we used the thesaurus function of VOSviewer using our thesaurus of 69 terms. There are two ways we can look at bibliometric data. The first method is bibliometric coupling, and the Second method is co-occurrences analysis. Bibliometric coupling helps to find interconnections between the entities using common citations, while co-occurrences of keywords help to find common themes in research. We have used VOSviewer software that uses visualization of similarity method (Van Eck & Waltman, 2007) to create both these types of networks. VOS mapping technique is closely associated with the well-known technique of multidimensional scaling (Waltman et al., 2010). However, the software output does not include information about clustering accuracy or any fit statistics like the silhouette value. A brief explanation of the VOS method developed by Van Eck and Waltman (2010) is provided below:

The common underlying mechanism is the frequency at which the terms or entities co-occur. Let the co-occurrences be denoted by co-occurrence matrix C with values  $c_{ij}$ . Next, the matrix is normalized to create a 'similarity matrix,' S with values  $s_{ij}$ . Normalization is done to avoid overlap of terms, thereby making the terms more readable. Among the various methods for normalization of the network clusters, we used normalization by associated strength. Association strength is a better method compared to other methods like the Jaccard index because it helps in the comparison between both low as well as high frequency occurrences of items (N. J. Van Eck & Waltman, 2007). Let the total number of occurrences of  $i$  items be  $w_i$  and total number of occurrences of  $j$  items be  $w_j$ . This gives us:

$$s_{ij} = \frac{c_{ij}}{w_i w_j}$$

Firstly, we explore bibliometric coupling in sections for authors and institutions. We have used bibliographic coupling, which is derived from the similarity between citations in different documents.

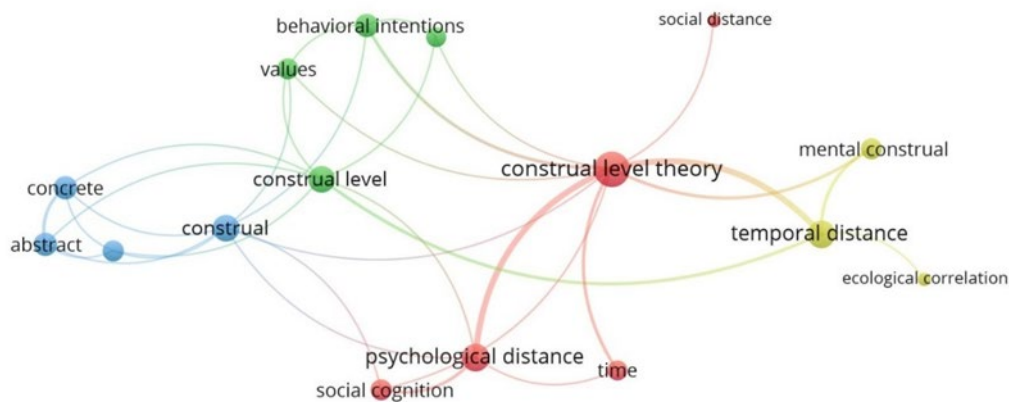
It is the linkage that connects two or more papers in their reference lists (Mas-Tur et al., 2019). We have also used fractional counting for authors. It is preferred over full counting as a measure of co-authorship as it helps clustering where some papers may have a large number of authors (Perianes-Rodriguez et al., 2016). The node is represented by the entity in bibliometric coupling networks. Here, each author indicates as a node. Authors with a higher number of papers will have a bigger node. The connection between two nodes can be called as the 'link' or 'edge.' A link between two authors signifies that they have worked together. The weight of the link between two authors is more if they have co-authored more number of papers hence the line between node is thicker.

Secondly, the themes are derived from co-occurrences of keywords. In the thematic network diagrams, the size of the node represents the total number of occurrences of the keyword. The connection between two nodes can be called as the 'link' or 'edge' and it signifies that both keywords have occurred together. In the thematic network, the weight of the link represents the link strength, which signifies the co-occurrences of the keywords. Nodes of the same color belong to the same cluster.

### Top Five Journals

In this section, the network of different themes using keywords in the top five productive journals on CLT literature is analyzed. Important keywords in the network diagrams are indicated in terms of their co-occurrence frequencies. These co-occurrences represent their importance as they represent a greater number of papers that are interlinked in the same journal. We have not used any cut-off for the number of words shown in the graph.

The network diagrams and analysis are presented below:



**Figure 3:** Co-occurrences of keywords in Journal of Experimental Social Psychology

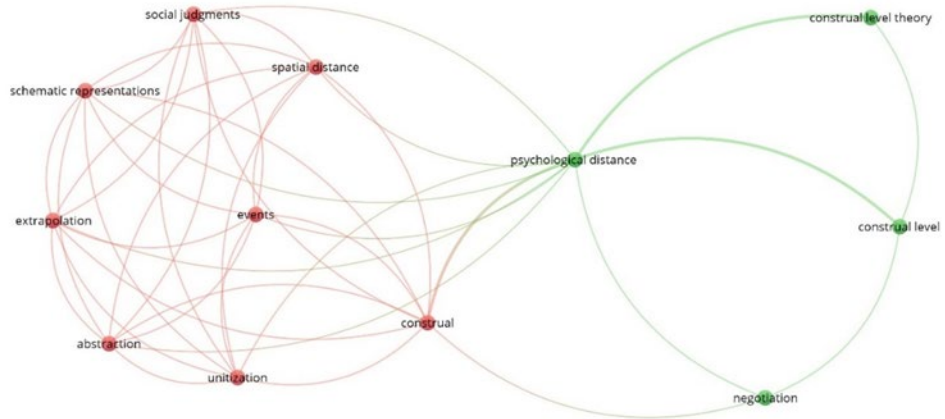


Figure 4: Co-occurrences of keywords in Journal of Personality and Social Psychology

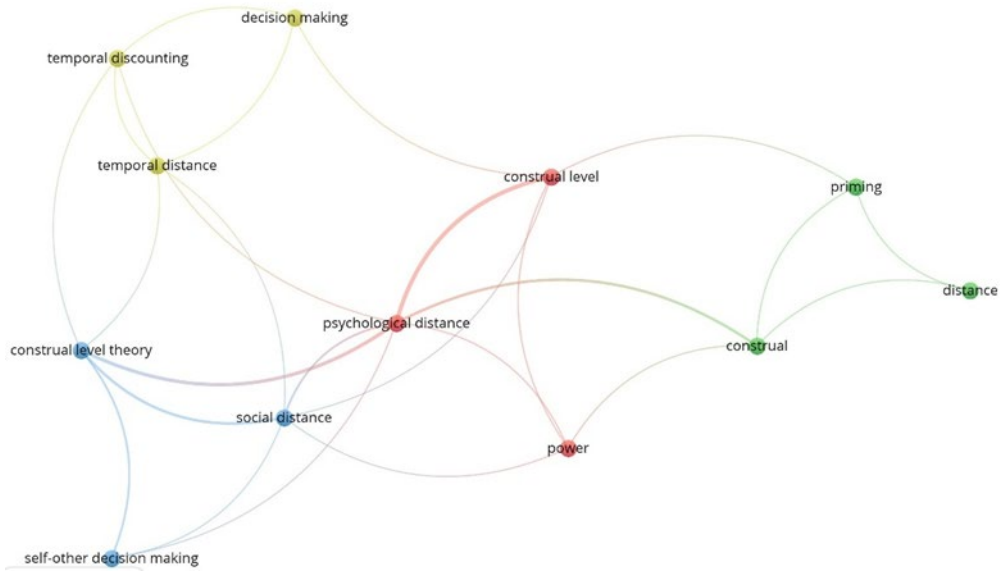


Figure 5: Co-occurrences of keywords in Personality and Social Psychology Bulletin

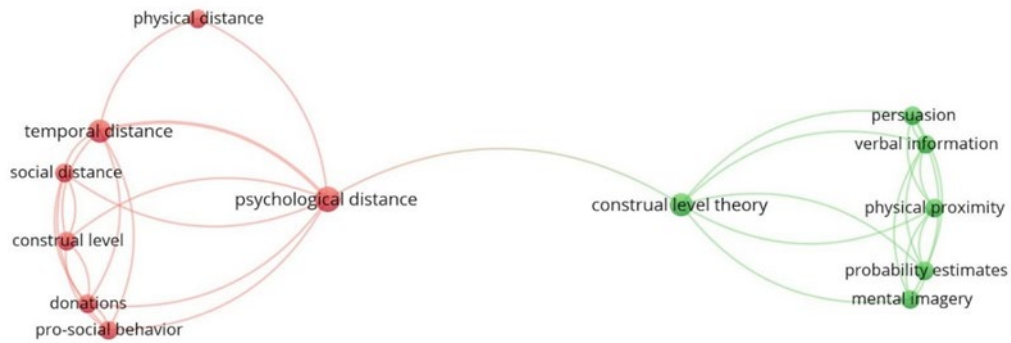
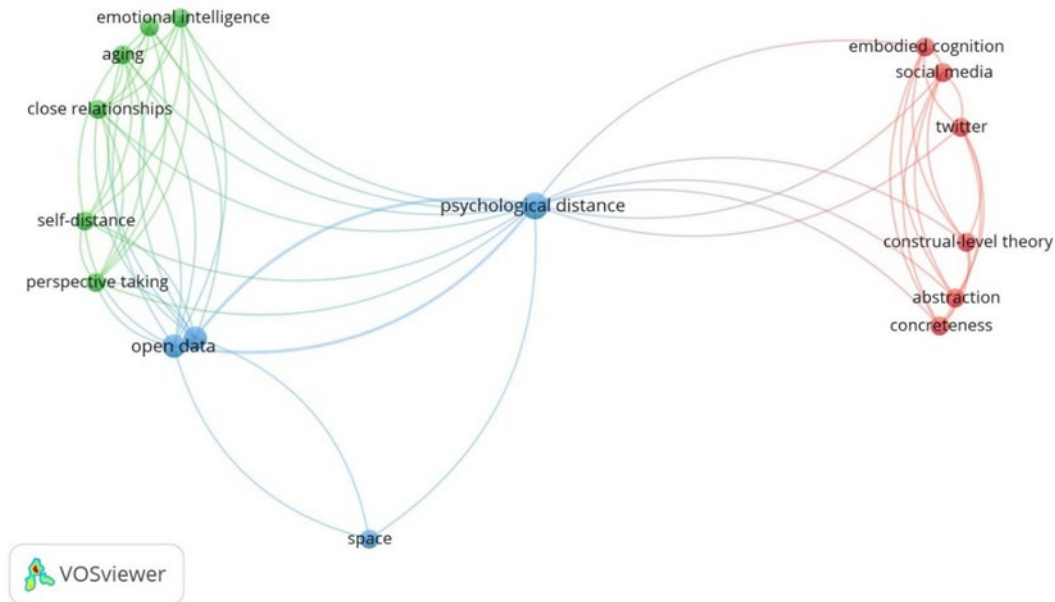


Figure 6: Co-occurrences of keywords in Journal of Consumer Psychology



**Figure 7:** Co-occurrences of keywords in Psychological Science

In Figures 3, 4, 5, 6, and 7 we can clearly see a strong linkage between CLT, Psychological Distance, and the three different dimensions of distances. It represents that these terms have commonly appeared together in the papers published in this journal. Interestingly, ‘Hypothetical’ distance does not appear in any of the journals as an important keyword. Some other keywords that have emerged in the network are also interesting in nature. Nodes belonging to the same cluster represent higher similarity. Thereby, different themes represented by different clusters of different colors.

Also, important themes that emerge are related to values and behavioral intentions, such as social cognition and ecological correlation. CLT has been explained with the help of metaphors for psychologically distant contexts using social cognition (Jia & Smith, 2013). Fiedler et al. (2012) expounded that there was an ecological basis for CLT as events that occurred in the past usually happened at another place as well.

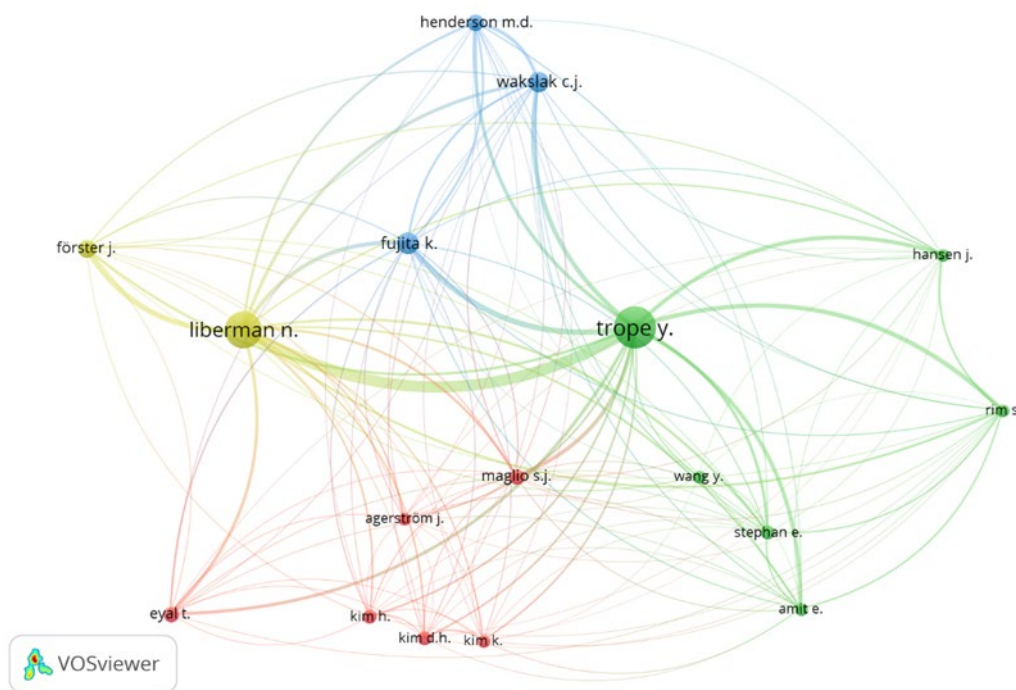
In the ‘Journal of Personality and Social Psychology,’ two noteworthy keywords that appear are negotiation and social judgment. An increased temporal distance leads to a higher preference for integrative and multi-issue consideration while a lower temporal distance facilitated the negotiation of a single-issue or piecemeal solution (Henderson et al., 2006). Another interesting finding was that increased spatial distance led to higher abstraction, and a schematic representation led to dispositional rather than situational behavior (Henderson et al., 2006).

The ‘Personality and Social Psychology Bulletin,’ a theoretical journal, has documented ‘self-other decision making’ as a core keyword in the blue cluster. According to the discussions, a major area of interest is the fact that when we decide for others, we have a higher likelihood of solving the problem and that we also generate more creative solutions for others than for ourselves (Polman & Emich, 2011). The ‘Journal of Consumer Psychology’ specializes in understanding consumer behavior from a psychological perspective. New keywords like ‘persuasion,’ ‘verbal information,’ physical proximity, ‘probability-estimates,’ and ‘mental imagery’ can be seen in the green cluster that this study is oriented towards. Jia et al. (2017) found that psychological proximity enhanced the visualization process, which, in turn, increased the level of belief. Psychological Science is also a core journal of Psychology that publishes cutting-edge research. We find that some of the burgeoning topics such as ‘social media,’ ‘Twitter,’ and ‘embodied cognition’ are present in the red cluster. Additionally, ‘aging,’ ‘self-distance,’

and ‘perspective-taking’ are also present in the green cluster. Findings show that spatial, social, and time exhibit a curvilinear scale along with psychological distance; the concreteness drops rapidly first then slowly along these dimensions (Sneffjella & Kuperman, 2015). A new theme discussed is ‘open data,’ in which research papers are published for the use of future researchers. Further, contrary to popular belief, wisdom might not be related to age but with the ability to distance oneself while deciding (Grossmann & Kross, 2014).

### Authors

In this section, we have analyzed the authors' network map. We can see from Figure 8, that the most influential authors are Yaacov Trope and Nira Liberman. They are also the most strongly coupled with other authors, which is evident from the number of connections emerging from their nodes.



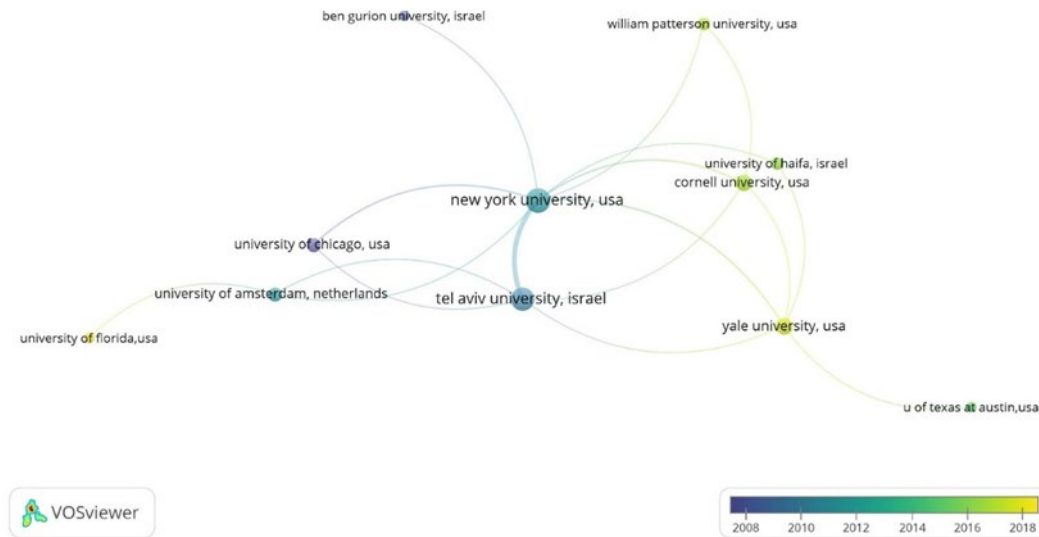
**Figure 8:** Author network map

The cluster of authors strongly connected together is highlighted in different colors. As seen in the weight of the network lines above, we derive that some of the authors like Y Trope, N Liberman, CJ Wakslak, and K Fujita are more strongly connected than others. Another observation is that Y Trope has the strongest connection, as presented by the number of links emerging from the larger nodes, followed by N Liberman, K Fujita, and CJ Wakslak. We also see that prominent authors like Liberman, Trope, Wakslak, and Fujita are well connected with each other. At the periphery of the network, we can see authors who are connected with the prominent authors. Also, there are smaller sub-networks that are formed between leading authors in this area of research.



## Institutions

Based on their bibliometric network, institutions that have stronger collaborations are plotted together. As shown in Figure 9, VosViewer provides the option to highlight the network based on the average year of the publication, which helps in visualizing the timeline of the collaboration over the years.



**Figure 9:** Institution network map with average year of publication

It can be seen that New York University and Tel Aviv University are the most well-connected. These are the institutions to which the pioneers of CLT, Y Trope, and N Liberman, are respectively affiliated. A pattern similar to the one seen for the author network is reflected in the universities. The central, well-connected universities are the best-performing ones in terms of publications. A strong presence of many American institutions supports the evidence of a high publication output from the USA. It may be relevant to note that besides Tel Aviv University, Israel also boasts contributions from two other universities, Ben Gurion University and the University of Haifa. Another interesting observation is that the network of institutions is not restricted by national boundaries, as many cross-country networks are visible on this map. However, we also see the prevalence of developed countries in the network like the USA, Israel, and the Netherlands. The color overlay represents the average year of publication. Actively participating countries during initial research are expressed as nodes that are blue in color, while universities like Yale and the University of Florida, where CLT research was conducted subsequently, are yellow.

## Country-wise Analysis

Similar to the publication analysis, the performance for the countries can be evaluated as provided in Table 4. In terms of the number of papers published, total citation count, and total link strength metric, the United States leads other countries. In terms of the TC/TP criteria, Israel leads the tally, followed by the United States and then the United Kingdom. These rankings may be explained by the affiliation of authors like Yaacov Trope (affiliated with New York University, USA) and Nira Liberman (affiliated with Tel Aviv University, Israel) and the significance of the countries where these top institutions are

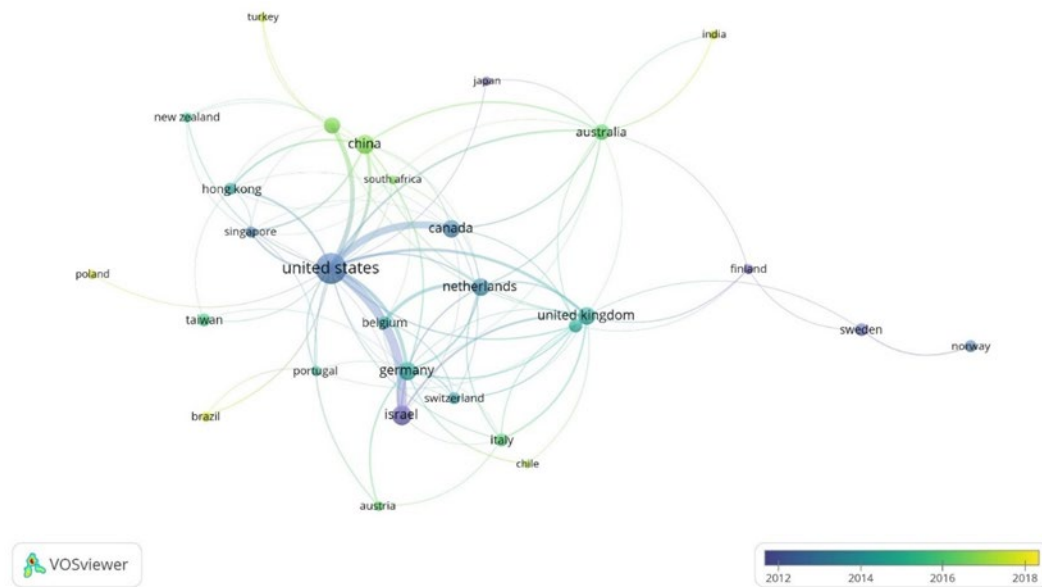


located. One of the odd members on the list is China. China has surged ahead in the publication output, which could be partially attributed to a higher rate of grant-funded papers (Wang et al., 2012). It has also been demonstrated that higher collaboration is key to lower variability in the research quality. (Rigby & Edler, 2005). The TC/TP value for China is significantly low, possibly due to a low level of collaboration with researchers from other countries, as is evident from the co-citation network for the countries. Another explanation could also be that the average year of publication is later than other top countries like the United States, which may have led to lesser citations.

**Table 4:** Citation structure of leading countries

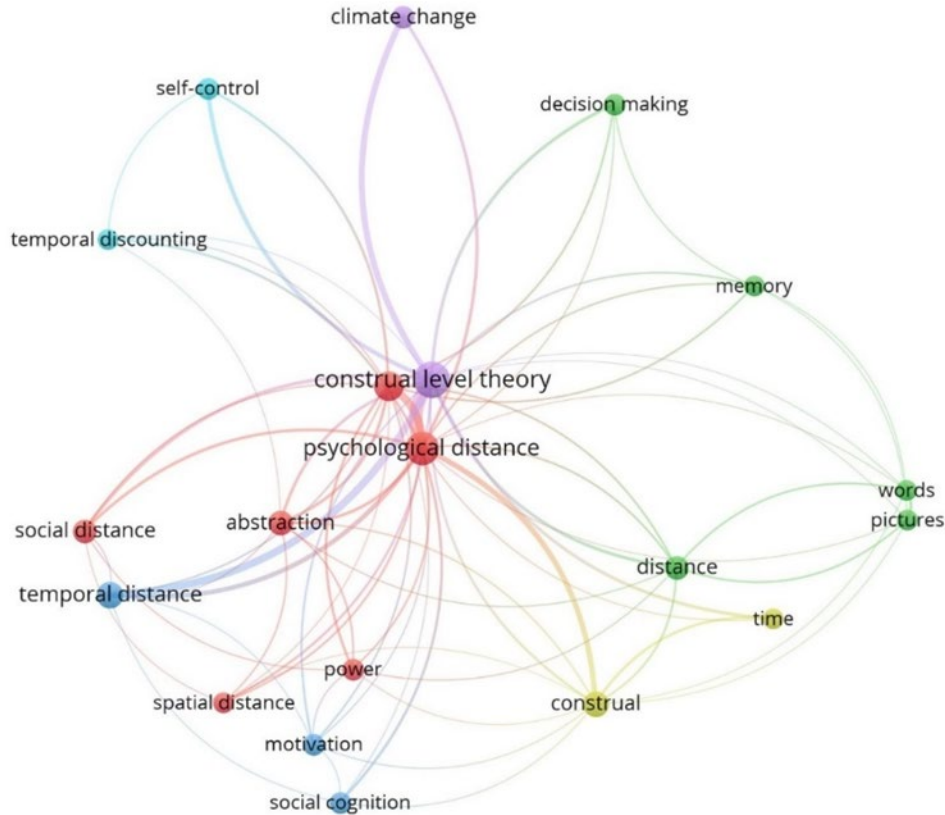
Country	TP	TC	Total link strength	TC/TP
<b>United States</b>	320	12121	153	38
<b>Israel</b>	67	8169	55	122
<b>China</b>	58	334	35	6
<b>Germany</b>	50	1150	43	23
<b>Canada</b>	49	334	35	6
<b>United Kingdom</b>	49	1729	33	35
<b>Netherlands</b>	48	1487	28	31
<b>South Korea</b>	34	254	19	7
<b>Australia</b>	29	225	21	8
<b>France</b>	20	179	19	9

In terms of the country network and top publishing countries, we can draw similar conclusions: the central countries in this network represent the most well-connected ones as they have shown remarkable outputs in CLT literature. The structure of the publications from leading countries supports the findings of the network analysis.



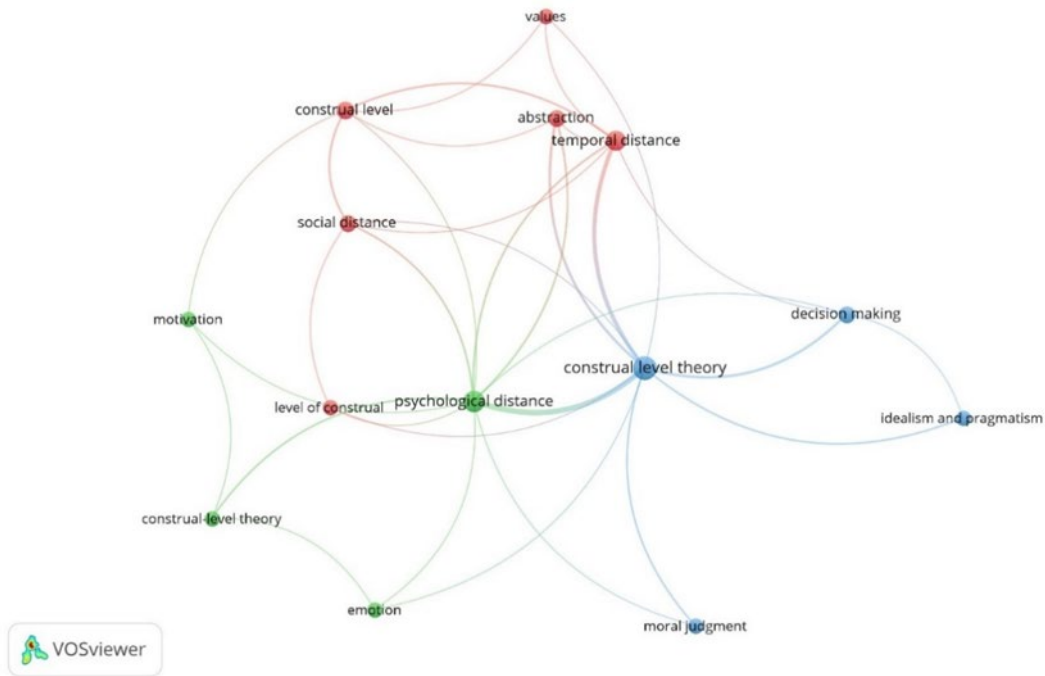
**Figure 10:** Country network map with average year of publication

Analyzing the keywords in the literature originating from the top-performing countries can give the readers an idea about the topics of interest that have been studied by researchers from these countries. Most of the keywords are core to CLT. We can also see that some research work has been done in areas of climate change, self-regulation, self-control, and values.



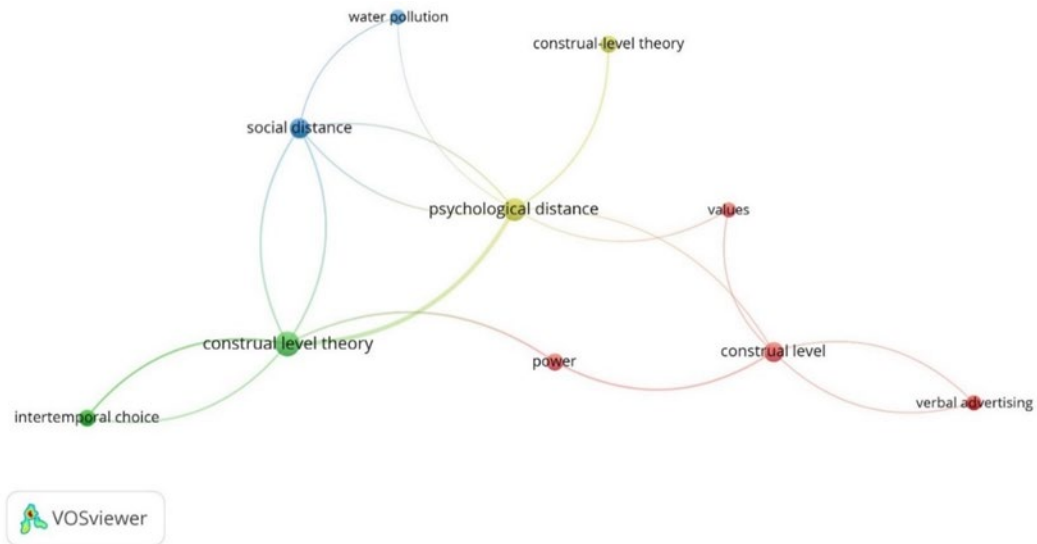
**Figure 11:** Co-occurrences of keywords in the United States of America

Over and above those related to CLT, keywords from papers of USA suggest that apart from theory-building work, application of CLT in new areas like climate change, self-control, and negotiation have been explored.



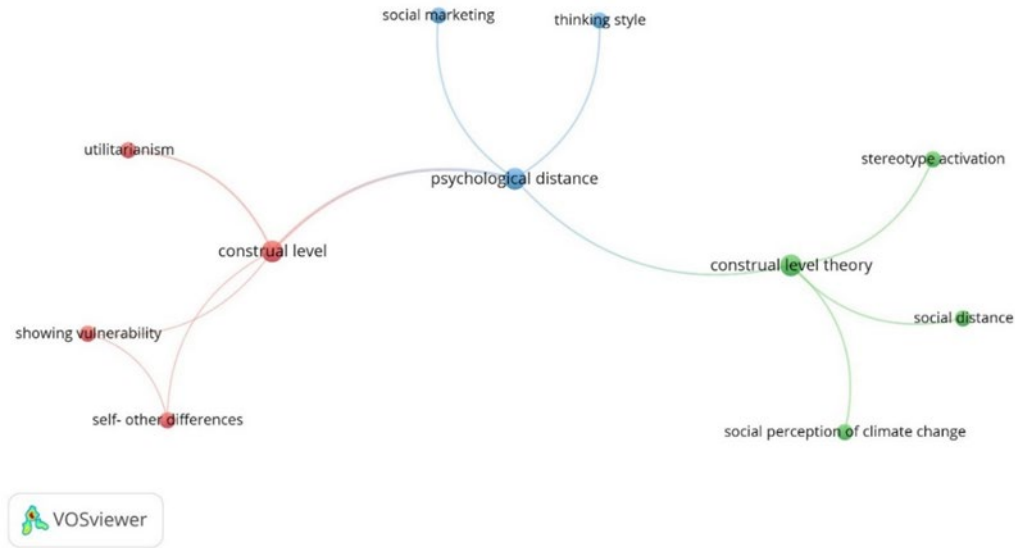
**Figure 12:** Co-occurrences of keywords in Israel

Research work in Israel throws up keywords like ‘emotion’, ‘moral-judgement’, ‘idealism and pragmatism’, ‘motivation’, and ‘values’. We can also see how different psychological dimensions appear in the network clusters of different colors.



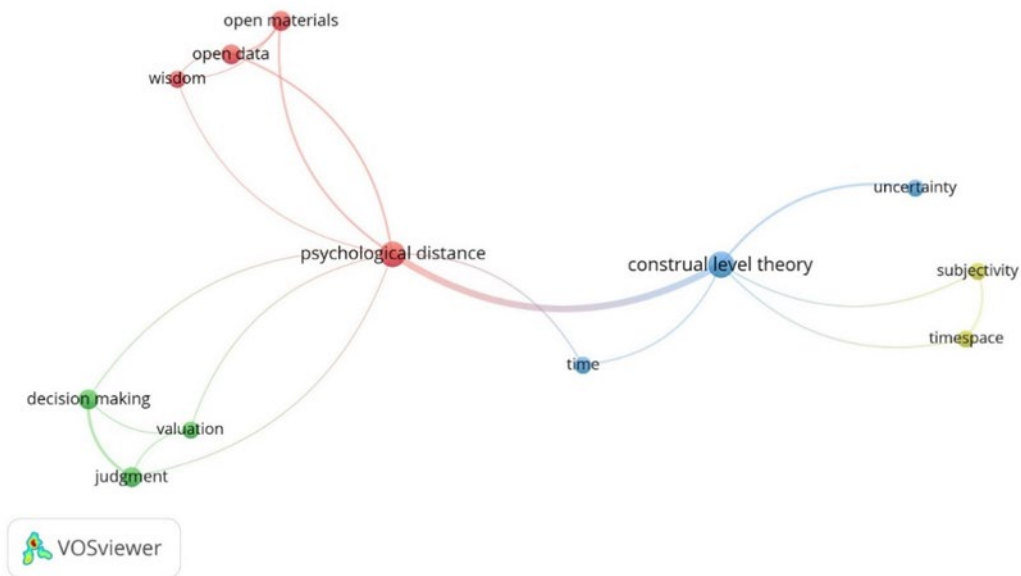
**Figure 13:** Co-occurrences of keywords in China

Research work done in China primarily revolves around CLT. Work related to verbal-advertising, power and values can also be seen. Keywords like ‘water pollution’ suggest that research related to environmental issues is being carried out in China.



**Figure 14:** Co-occurrences of keywords in Germany

Research in Germany has revolved around three different clusters. In the green cluster, we can see terms like ‘social perception of climate change’ and ‘stereotype activation’. The blue cluster has terms related to ‘social marketing’ and ‘thinking style’. Terms like ‘utilitarianism’, ‘showing vulnerability’ and ‘self-other differences’ are visible in the red cluster.



**Figure 15:** Co-occurrences of keywords in Canada

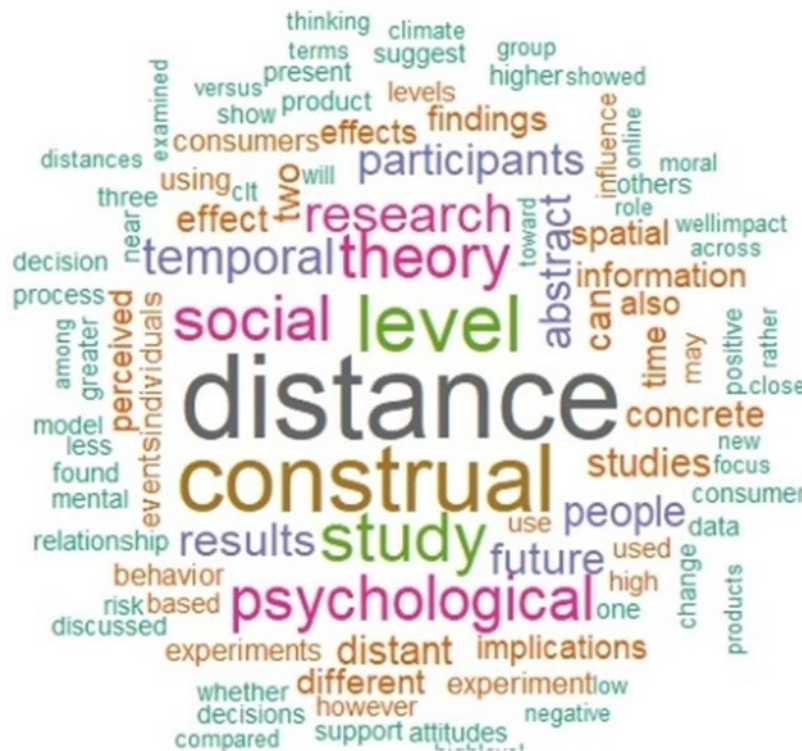
Research in Canada deals with unique variations. On one hand, there are terms like ‘subjectivity,’ ‘uncertainty’ and ‘time-space’ while on the other hand, in another cluster, we see terms like ‘wisdom,’ ‘open data’ and ‘open materials.’ In the green cluster, we see terms like ‘decision making,’ ‘valuation’ and judgment.’

### Analyses of Research Topics and Keywords

In the first set of analyses, we explore the top keywords through a word-cloud and, subsequently, the word network through keyword network analysis. The topic analysis is done in two parts: Firstly, we explore the top keywords that exhibit the highest frequency in CLT literature. This would present an overview of important areas of research around CLT. Secondly, we explore the topics of interest in detail through the keyword analysis, which would examine the trends over the years and establish important topics for future research. The keyword network is analyzed based on the keyword link strength for the number of citations as well as the average years of publication for the keyword. This would demonstrate the trend in the publication as well as the direction of research.

#### Keyword Word-cloud Analysis

The abstracts from the 680 papers were collated into a text document. The file was imported in R. Further analysis was done through the text-mining package as well as wordcloud2 package. The results of this analysis are presented below:



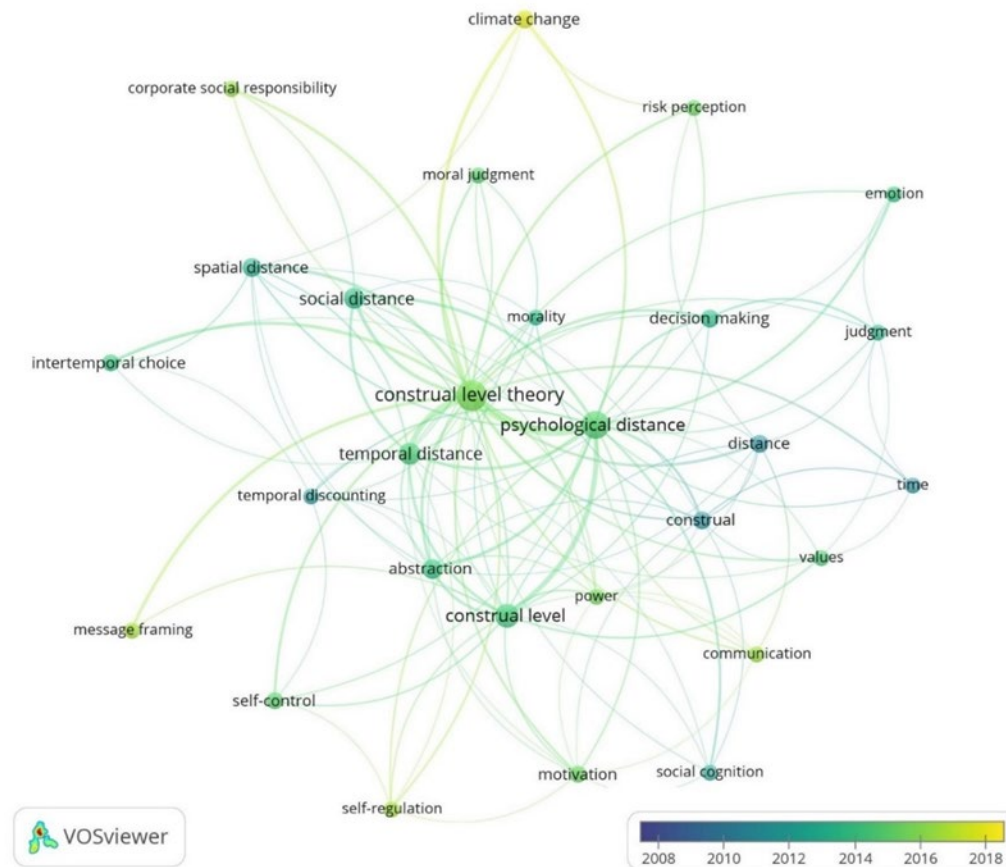
**Figure 16:** Word cloud of top 100 words

The most frequently occurring word in the abstracts of all the papers is ‘construal.’ The concept of a construal is key to CLT and has both ontological and epistemological significance. The second prominent word is ‘distance’ which may be used to signify the psychological distance of the context from the individual. Subsequently, we see ‘psychological,’ which relates to the same construct. The majority of the papers were from journals of social psychology, and we see ‘social’ as the next important word. Following these are words like ‘experiment,’ ‘model,’ ‘show’ and ‘support’; they are

related to the methodology. Additionally, some words from consumer behavior like ‘consumers,’ ‘consumer,’ ‘behavior’ are also present. Delving deeper into the connections between these words, we shall explore the word networks below in the keyword network analysis.

### Keyword Network Analysis

The network of important keywords describes the areas of discussion in the present literature. In this network of co-occurring words, the color superimposition represents the average year of publication. This can show a trend of the topics of interest around CLT.

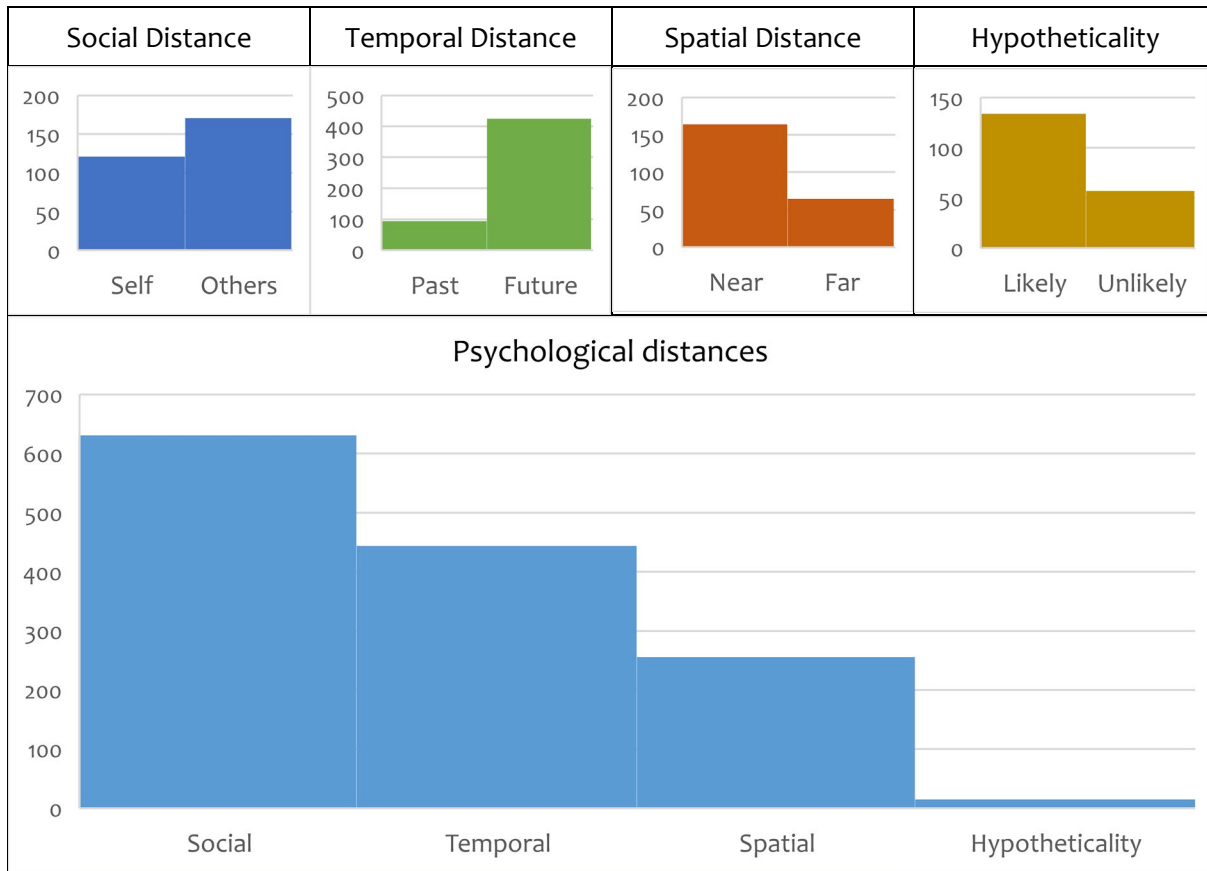


**Figure 17:** Keyword network analysis with average year of publication

We see that the initial theoretical work was around the psychological dimension of time. The average year of publication of papers is earliest around the keywords of ‘construal’ and ‘time.’ Later, the core theory of CLT was developed with other dimensions, and also newer concepts like ‘climate change’ and ‘self-regulation’ emerged in the literature.



**Construct Keyword Analysis**



**Figure 18:** Psychological distances

The frequency plots of keywords related to psychological distance is presented in Figure 18. It is created from a corpus of the abstracts of the 680 papers. In Figure 18, we can also see the frequency plots for all the four dimensions of psychological distance. We can also see the plots of the sub-dimensions. In these plots, the synonyms of keywords have been mapped together. As an example, keywords ‘real’, ‘likely’ and ‘realistic’ are mapped into one to aid the plotting process. Social distance can be visualized as a measure of how perceptually close or distant an entity is from oneself (Bogardus, 1923). ‘Self vs others’ bifurcation is used in many papers to elicit the high vs. low social distance, especially in the context of CLT(Li & Rao, 2019; Lu & Xie, 2019).

We can clearly see that authors have used social distance to a great extent in their studies, while less importance has been given to hypotheticality. This finding is similar to that of Soderberg et al. (2015). Bias within these dimensions is visible. We see that past events have been used less often than future ones. Similarly, the words ‘near’ and ‘likely’ have been used more often than ‘far’ and ‘unlikely.’ A reason for the bias could be that researchers have been using similar priming methods to have better support for their research designs. A second reason could be that keywords that represent other dimensions are used as compound words, for example, ‘less likely’ rather than ‘unlikely.’ However, it would not be the case with ‘past and future’ as well as ‘near and far.’ A third explanation could be that most of the research output is theory application, and they contend with validation of CLT since the original papers have already established strong causal links between the four dimensions (Liberman & Trope, 2008; Liberman & Trope, 1998). Another aspect could be the non-reporting of the non-accepted

hypothesis (Greenwald, 1975). One of the solutions could be the use of standardized reporting, using effect-sizes, confidence intervals, and p-value reporting, independent of the significance (Cohen, 2016; van Witteloostuijn, 2019).

## **DISCUSSION, FUTURE RESEARCH DIRECTIONS AND LIMITATIONS**

In this we have discussed the results, future research directions and limitations of the study.

### ***Discussion***

The bibliometric analysis present in this paper is done with the intention to provide an overview of the literature available in this area. There is considerable interest in the application and extension of this theory. CLT is used in areas of applied psychology and consumer behavior to understand the cognitive process in a simple, yet lucid manner. Through this analysis, we also derive that there is a huge concentration of publications among certain authors, institutions, publications, and countries. As expected, this finding also points towards a lack of collaboration between authors who are not affiliated with well-connected institutions. However, countries like Turkey, India, Poland, and Brazil have also contributed to the papers in recent years, as seen in *Figure 10*. The yellow color represents that average year of publication for these countries is around 2018, and it signifies that they are new entrants in this research area.

The founders of the theory, Nira Liberman and Yaacov Trope are prominent authors in the sample. This could be explained by the 'Matthew Effect,' which explains such concentration due to the 'cumulate advantage' which can be reaped by successful authors (Andrés, 2009). This study also indicates that there is a concentration of publications in countries like the USA, China, and Israel, as also in certain journals like the *Journal of Experimental Social Psychology*, *Personality and Social Psychology Bulletin*, and the *Journal of Personality and Social Psychology*. These findings are consistent with Bradford's Law which predicts that a small number of journals contribute to a large number of papers on a given subject (Andrés, 2009).

Some core principles of CLT have a recurrence in the literature, which shows up in the keyword network maps. These are the words that revolve around 'construal,' 'construal level,' 'psychological distance,' etc. However, some interesting exclusions and inclusions are there in the network maps. One exception is that it is skewed towards social and temporal distances. The most common studies are on social and temporal distance, while spatial distance is less commonly studied, as is evident from the keyword analysis. 'Hypotheticality' is almost absent from top keywords, which suggests that very few studies have been based on this dimension of CLT. This is in line with the earlier findings of Soderberg et al. (2015). However, our data also reveal similar disproportionate use of constructs and sub-constructs. 'Abstraction' is more common than concrete. Similarly, sub-constructs like 'past' and 'future' directions of time are not equally studied, as is evident from *Figure 18*.

Word-clouds and networks have revealed some important areas of research on CLT. Researchers have not explored hypotheticality and spatial distances. Also, in terms of the key areas of applications, many areas of social sciences are not represented as much. CLT can find applications in areas like Operations, Information Systems, Social Sciences, and Policy Making.

### ***Future Research Direction and Limitations***

Our research questions have pointed out some gaps in CLT literature. Firstly, dimensions of hypotheticality and spatial distance require further exploration. Secondly, sub-dimensions are not



equally represented in the studies. More studies have used 'future' vs. 'current' over 'past' vs. 'current' manipulations. Similarly, more studies have used 'likely' when compared to 'unlikely' keywords in their studies.

Using the publication trend analysis, we have uncovered some new topics of research through their average year of publication. Some of these new areas are 'climate change,' 'message framing' and 'self-regulation.' In the context of climate change, it was found that environment-related information presented more abstractedly had better results than that presented concretely (Reczek et al., 2018). In the area of message framing, CLT predicts that loss-framed messages work better with lower construal level while gain-framed messages work better with higher construal level (Chang et al., 2015). One of the papers found that people were most receptive to energy-saving interventions during the first three months of moving into a new house (Verplanken & Roy, 2016). Another paper found that in the context of environmental behavior change, the information presented in a positive form had better persuasion than that which was negatively framed (Reczek et al., 2018). Self-regulation is highly dependent on the inter-link between the construal level of the individual and the context. Individuals with higher 'consideration for future consequences' (CFC) are more receptive and motivated towards an abstract recommendation, resulting in higher self-regulation, while those with lower CFC are more receptive towards specific recommendations and proximate benefits (Buhrau & Sujan, 2015). Another study into self-regulatory framework found that for the success of self-regulatory messages, the messages must focus on the 'pleasures of adhering' while promoting action and must focus on the 'pains of not adhering' for messages that talk about prevention of an action (Cesario et al., 2013).

The most common methodologies employed in the study of CLT are experimental design, followed by a review. The reason for the same can be drawn from the deeply rooted tradition of psychological science, where experiments are commonly employed to establish causality and validate the hypothesis. In CLT, we found fewer papers using other methodologies of research like regression, structural equation modeling and cluster analysis. We urge future researchers to investigate applications of this theory through other methods. The Behavior Identification Form (BIF) scale has been used to measure the construal level (Vallacher & Wegner, 1989). It can be used in the future to study the moderating effect of construal level on behavior. Future research work can take forward this conversation on CLT and explore new areas of application.

A major observation is that the studies are heavily concentrated in the journals pertaining to Psychology, followed by Marketing, especially on Consumer Behavior. There are only a few studies on Environmental Sciences, Earth Sciences, and Medical Sciences. There is a dearth of research material published using this theory in the core management areas of Strategy, Operations, Information Systems, Human Resources, Organization Behavior, and Finance. Future researchers may extend its application in newer areas of Social Science and Management.

The objective nature of bibliometric analysis limits the opportunity to delve into a subjective discussion of the papers. Despite this limitation, previous review papers are available, and researchers can refer to them for further analysis. Another limitation is that of search and filtering. Although the methodology is in two stages and attempts have been made to eliminate biases, some papers may have been omitted from the search. As the collation of data from different sources is difficult due to the difference in formats, this study is based on a single database, which means that there may be a number of papers that are not included as they were not indexed by SCOPUS. SCOPUS database also presents data issues in terms of the naming of institutions, which had to be manually corrected during analysis.

Another limitation is that the network diagrams are plotted by limiting to the top nodes only, based upon their interconnections. In the network analysis of the top authors, some authors may be missed

who have lower number of papers or no co-author at all. For instance, some important papers published in 2018 and 2019 with very few citations may have been excluded in the bibliometric coupling.

## CONCLUSION

A great deal of interest has been generated regarding the application and extension of the CLT theory and this study aims to provide an overview of the same. It has been used in areas of applied psychology and consumer behavior in order to understand the cognitive process in a simple, yet lucid manner. In this analysis, we have highlighted some of the key social problems which are being studied through the theoretical lens of mental construal. Also, there has been a trend towards using CLT to study self-regulation, climate change, and message framing in recent times (O'Connor & Keil, 2017; Rothman et al., 2019; White et al., 2011). Many critical problems of the world can be solved through optimum behavioral understanding, and CLT can help do that.

This analysis establishes the fact that there is a huge concentration of publications among certain authors, institutions, publications and countries. But it also points towards a lack of collaboration between authors who are not affiliated with well-connected institutions. Research output is a representation of the intellectual output of a country but what is noticeable in the research on CLT is that the concentration of studies is limited to developed countries as opposed to developing countries. However, this trend is changing as it is evident from the evolution of publication over the years. Yet another observation is that the best performing entities (authors, institutions, countries, etc.) are also the best-connected ones, with collaboration being the key to enhanced research output. The recurrent theme throughout the analysis is that the strength of the connection is stronger for the prominent nodes, which is an indication for future researchers to establish collaborative working links to enhance their productivity.

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