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REVIEW ARTICLE

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Mapping the jungle: A bibliometric analysis of research into construal level theory

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Abstract

Construal level theory (CLT) offers a valuable framework to explain the mechanisms that trigger evaluations, predictions, and behaviors by linking the degree of mental abstraction (the construal level) to psychological distance. CLT-related research has produced numerous publications in a variety of domains, impeding an ongoing overview of the research field and limiting its advancement. Addressing this concern, our paper presents the results of a comprehensive bibliometric analysis of CLT-related research. This analysis identifies leading authors and the networks in which they operate. We find that a well-connected, stable core of prominent authors predominantly shaped CLT research and was responsible for its expansion. In addition, we used topic modeling to identify latent topics and research trends, with the results showing that CLT research has expanded into more interdisciplinary and applied contexts. Specifically, although CLT's relevance for consumer research has amplified and applications in areas such as climate change and sustainability have surged, the classic areas of CLT research, such as planning fallacy and impulse control, have lost momentum. Building upon the results of our topic analysis, we identify future research paths and specifically call for a more comprehensive societal focus in CLT-related research.

KEYWORDS

bibliometric analysis, coauthorship, construal level theory, latent dirichlet allocation, topic analysis

1 | INTRODUCTION

People transcend their direct, daily experiences: They remember the past, think about the future, and imagine themselves in various situations. Previous research has shown that mental representations of direct and indirect experiences differ considerably and that they quite distinctly affect evaluation, prediction, and behavior (Frederick et al., 2002; Liberman & Trope, 2008; Wilson & Gilbert, 2003). Pioneered by Trope and Liberman (2003, 2010), construal level theory (CLT) offers a valuable framework to explain the mechanisms that trigger evaluations, predictions, and behaviors by linking the degree of mental abstraction (the construal level) to psychological distance. Since its introduction, CLT has received considerable research attention, as indicated by the high scholarly citation counts of its seminal

articles.[1] At the same time, researchers extended CLT by further exploring the link between psychological distance and the construal level (Soderberg et al., 2015; Yan et al., 2016) and by emphasizing its implications for processes in the domains of general (e.g., Fujita et al., 2006; Schwartz et al., 2018), social (e.g., Eyal et al., 2009; Jiga-Boy et al., 2013), and consumer psychology (e.g., Cho et al., 2013; Ding & Keh, 2017).

With CLT's increasing maturation, research produced conceptual papers (Dhar & Kim, 2007; Liberman & Trope, 2014; Trope & Liberman, 2003, 2010; Wiesenfeld et al., 2017) and meta-analyses (Soderberg et al., 2015) that summarize the state of research and synthesize the empirical results. Although these studies offer valuable insights, they primarily rely on qualitative reviews with a narrow scope. That is, these review studies focus on a specific area, rather than offering an overarching picture of the rich and diverse literature on CLT-related research. Moreover, by their very nature, review studies do not assess the structure of scholarly networks formed by researchers' coauthored works. As these structures advance and preserve the CLT domain's intellectual knowledge, deconstructing them is key to understanding schools of thought and appreciating the impact of seminal publications on the field.

CLT-related research is undertaken in the dispersed fields that emerge from researchers' backgrounds, research questions, and methodologies. This diversity renders the integration of research results difficult and impedes the creation of future research agendas and research endeavors that are vital for understanding and advancing the field. To resolve these issues, researchers routinely use bibliometric analyses that quantitatively assess scientific publications to identify key authors and topics that drive thematic developments (Boyack & Klavans, 2014; Cobo et al., 2011; Zupic & Čater, 2015). Bibliometric analyses have become the norm in numerous fields of science, including psychology, whose researchers use them in various contexts, including consumer research (Baumgartner, 2010), well-being (Dominko & Verbič, 2019), and morality (Ellemers et al., 2019).

We apply a set of bibliometric methods to CLT-related research to extend prior review articles and meta-analyses in the field. Our analyses offer a comprehensive overview of both the current state of the research and the structures within the research community. We identify leading authors, as well as the coauthorship networks in which they operate, to provide insights into the power structures and offer a new perspective of the actors who drive CLT's advancement and preservation. By applying a text-analytic approach, we also identify the overarching themes that have shaped the field and disclose trends that are relevant for future CLT research.

2 | CONSTRUAL LEVEL THEORY

CLT (Trope & Liberman, 2003, 2010) proposes a positive, reciprocal relationship between psychological distance and the level of abstraction at which a target is construed (construal level). CLT is rooted in action identification theory (Vallacher & Wegner, 1989), which postulates that individuals can represent an object at different levels of abstraction. At the turn of the millennium, Yaacov Trope and Nira Liberman linked this notion to psychological distance, which refers to individuals' subjective judgment of how far a target (e.g., an event or object) is from their direct experience (Trope & Liberman, 2010), and suggested that thinking about the past or the future increases mental abstraction (Liberman & Trope, 1998; Trope & Liberman, 2003). During the following years, they developed this temporal construal theory (TCT) into CLT by extending their reasoning to other types of psychological distance (temporal, spatial, social, and hypothetical distance) and postulating "a general theory of psychological distance" (Trope & Liberman, 2010, p. 440).

CLT builds on the basic idea that directly experienced targets allow an observer to obtain extensive, detailed, and contextualized information. Increasing the psychological distance between the observer and the target decreases the available amount of information about the target, hence its mental representation requires a certain degree of abstraction; that is, a higher construal level (Liberman & Förster, 2009; Trope & Liberman, 2010).

Although researchers agree on the four types of psychological distance and their interrelatedness (Bar-Anan et al., 2007; Fiedler et al., 2012), the construal levels' characteristics are far more diverse, incorporating a wide range of construals related to objects, persons, and actions (Burgoon et al., 2013; Liberman & Trope, 2014; Soderberg et al., 2015). Table 1 offers an overview of the different construal levels' characteristics and distance types.

Empirical research supports the distance-construal link (Bar-Anan et al., 2006; Liberman et al., 2007), indicating that the relationship is curvilinear and independent of the distance type (Soderberg et al., 2015). Recent research also sheds light on the background processes underlying the relationship between distance and construal types (Yan et al., 2016; Yan, 2014).

Consumer research draws strongly on CLT to explain various effects related to perception (Ding et al., 2021; Stillman et al., 2020), information processing (Pizzi et al., 2014), preference shifts (Henderson, 2013; Trope & Liberman, 2000), and decision making in general (Halamish et al., 2017; Sun et al., 2019). CLT also contributes to research on background processes, such as processing fluency (Alter & Oppenheimer, 2008; Mehta et al., 2012; Mrkva et al., 2018) and fit effects; that is, the favorable effects of matching information display with processing styles (A. Y. Lee et al., 2010; Zhao & Xie, 2011).

This brief review of CLT research suggests that the concept covers a great deal of ground. Its dispersion complicates efforts to offer a concise overview of the field's research state. Our bibliometric analysis addresses this issue by presenting a data-driven approach to identify research streams based on publication records.

[1]For example, as of June 18, 2021, (Trope & Liberman, 2010) has been cited 2128 times in the Web of Science.

TABLE 1 Examples of the characteristics and correlates of psychological distance and the construal level

	Low	High	Example literature
Psychological distance			
Temporal	Now, near future, or past	Distant future or past	Liberman and Trope (1998)
Spatial	Here, near place	Distant place	Fujita et al. (2006)
Social	Self; similar or familiar person; in-group	Dissimilar or unfamiliar person; out-group	Kim et al. (2008), Lo et al. (2019), Zhao and Xie (2011)
Hypothetical	Reality; high probability	Low probability	Wakslak et al. (2006)
		↕ positive, reciprocal relationship ↕	
Construal level			
Object construal	Details; local figures	Gestalts; global figures	Gasper and Clore (2002), Huntsinger et al. (2010)
	Examples; narrow segmentation	Categories; broad segmentation	Krüger et al. (2014), Liberman et al. (2002), Maglio and Trope (2011), Smith and Trope (2006)
	Pictures	Words	Amit et al. (2013), Yan et al. (2016)
	Color imagery	Black and white imagery	H. Lee et al. (2014, 2016)
	Secondary features	Primary features	Bullard et al. (2019), H. Lee et al. (2014), Trope and Liberman (2000)
Person construal	Behaviors, situations	Traits, dispositions	Bullard et al. (2019), Eyal et al. (2009), Wakslak et al. (2008)
	Individual	Group identity, stereotype	Hess et al. (2018), McCrea et al. (2012)
Action construal	Feasibility concerns: How an action is performed	Desirability concerns: Why an action is performed	Liberman and Trope (1998), Sagristano et al. (2002)
	Situational considerations/ demands	Goals, values	Fujita and Carnevale (2012), Henderson and Wakslak (2010), Rees et al. (2018)
	Concrete words (e.g., action verbs)	Abstract words (e.g., adjectives)	Orvell et al. (2019), Semin and Fiedler (1988)

Note: Dimensions, example characteristics, and correlates adopted from Soderberg et al., (2013, p. 506), Liberman and Trope (2014, pp. 365–366), and Soderberg et al. (2015, pp. 526–527).

3 | METHODS

The research data were obtained from the Web of Science (WoS). We developed a comprehensive search term list and unambiguous inclusion and exclusion criteria to retrieve relevant articles (see Figure 1 for details).

3.1 | Search terms

To generate a list of search terms, we performed a preliminary WoS search for "construal level theory" in titles, abstracts, author keywords, and keywords that the WoS assigned automatically (keywords Plus®, Garfield & Sher, 1993). We obtained the most frequent keywords from the identified articles and used keywords describing the conceptual CLT foundations ("construal leve*", "mental construa*", psychological distan*") for our final search term list. We also added "temporal construa*" to take TCT into account. We discarded the subset solely based on the search term "psychological distan*" due to a lack of relevant articles.

3.2 | Inclusion and exclusion criteria

To refine the results, we applied inclusion and exclusion criteria regarding the document type, publication year, journal ranking, and article content. Specifically, our analysis considers all journal articles published during the time frame ranging from 1994 to 2020. We only retained journals ranked in the first or second quartile (i.e., Q1 and Q2) in the SCImago journal ranking (SJR, SCImago, n.d.). As SCImago does not offer journal rankings before 1999, we applied the 1999 ranking to articles published before this year. Similarly, as the 2020 SCImago ranking had not been released at the time of the analysis, we applied the 2019 ranking.

Finally, to ensure that the identified articles use CLT or TCT as their conceptual background, we coded each article manually and only included articles (1) in which the authors explicitly state "construal level theory" or "temporal construal theory" as conceptual background, or (2) that deal with the conceptual foundations, antecedents, or consequences of CLT and its concepts.

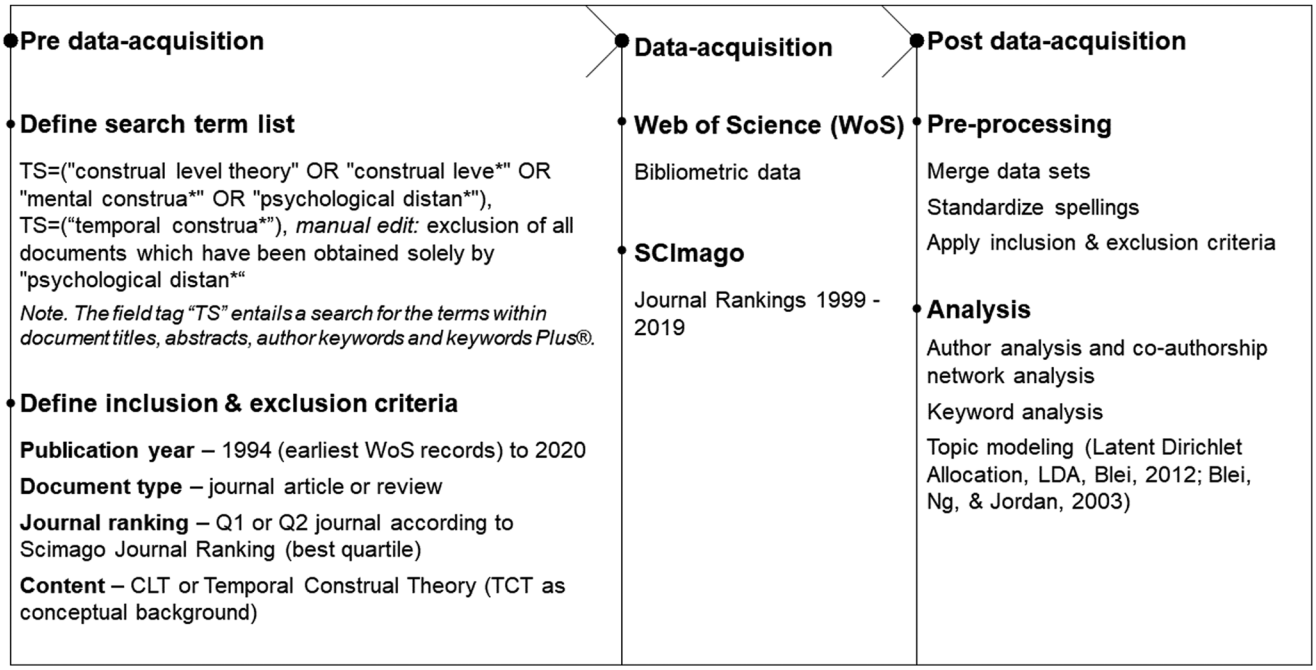

FIGURE 1 Data acquisition and pre-processing for the subsequent bibliometric analysis

3.3 | Analysis

We submitted our data to a range of bibliometric analyses in R to explore the author and topic structures (R Core Team, 2020).[2] To extract information on the author's prominence, we counted the number of author appearances and used network analysis to map coauthorships. To cluster authors within these networks, we applied the infomap procedure (Rosvall & Bergstrom, 2008).

Furthermore, we performed a keyword and topic analysis to identify research themes and their development. To generate a set of relevant keywords, we (1) identified similar keywords (e.g., "affective forecasting" and "affective misforecasting") and merged them into a single term, and subsequently (2) removed short and long-tail keywords (i.e., the most and least popular keywords). To identify the research topics, we drew on latent Dirichlet allocation (LDA; Blei et al., 2003; Blei, 2012), which features prominently in topic modeling. LDA is based on the assumption that each document consists of a mixture of latent topics and that keywords are manifestations of these topics. This method allows bibliometric researchers to assess keyword distributions across articles and, accordingly, to identify the underlying topics. LDA differs from other clustering techniques as it produces a probabilistic assignment of keywords to topics and topics to documents. As a result, it reflects the nature of scientific publications more appropriately than dichotomized assignments (Bittermann & Fischer, 2018; Blei, 2012; Griffiths & Steyvers, 2004). To ensure the stability of the results, we followed the proposed procedure of Mantyla et al. (2018), ran the LDA with multiple repetitions ($n = 100$), and clustered the results with a k-medoids approach to identify distinct topic clusters.

We made our data and R code available and also provided extensive Supporting Information (see Table A1 in the Appendix for an overview) that includes details on the author and topic analyses and a journal citation analysis revealing information flows and power balances between publication outlets. We also identified relevant authors and articles per topic cluster, as well as authors and articles bridging topic clusters. These additional analyses enhance the insights garnered from our topic analysis and provide a more in-depth depiction of each topic cluster. The R code and data can be accessed via the OSF platform at: https://osf.io/wukfd/. Moreover, we have deployed extensive parts of our analyses in an interactive shiny web application (https://mktg.shinyapps.io/CLT_bibliometricAnalysis/).

4 | RESULTS

4.1 | Data pre-processing

The WoS search yielded 1,225 results. We excluded 16 articles due to their document type or retraction, 66 articles due to their journal ranking ($n_{Q3} = 27$, $n_{Q4} = 13$, $n_{\text{not ranked}} = 2$, $n_{\text{not listed}} = 24$), 248 articles due to their content, and one article due to its publication year. Therefore, our final data set comprises 894 articles, 775 of which were published in Q1 journals. We also ran the analyses with the content-reviewed articles ranked Q3 and Q4 in SCImago, as well as with non-ranked or non-listed journals—see Table A1 in the Appendix for further details.

[2]Our analysis primarily draws on the R packages *bibliometrix* (Aria & Cuccurullo, 2017), *igraph* (Csardi & Nepusz, 2006), *visNetwork* (Almende et al., 2019), *quanteda* (Benoit et al., 2018), *topicmodels* (Hornik & Grün, 2011), and *cluster* (Maechler et al., 2019).

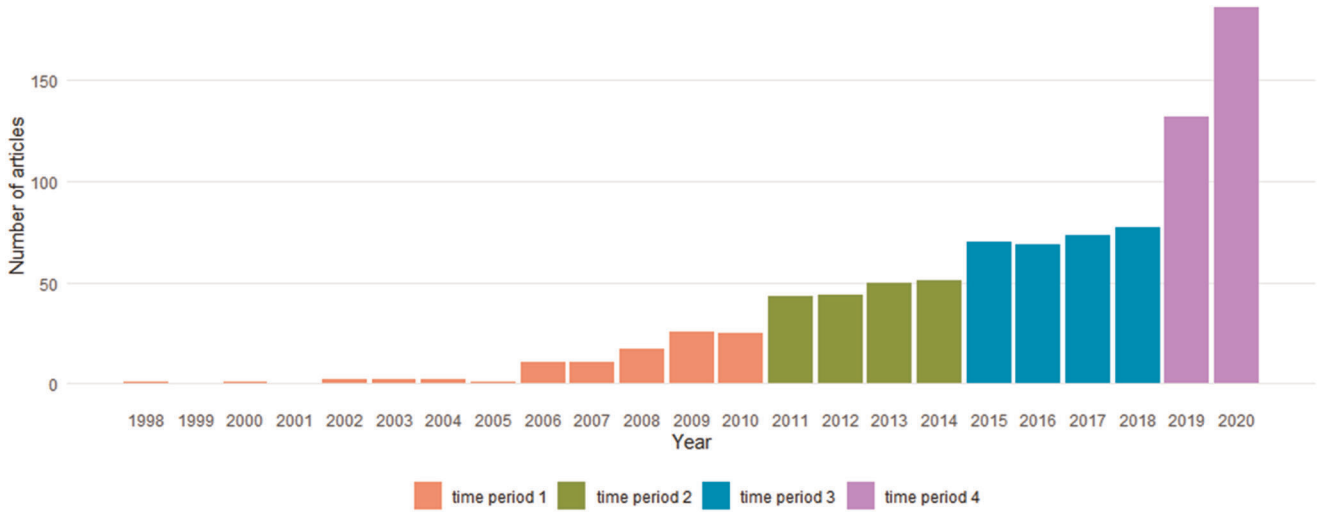

FIGURE 2 Number of articles per year

TABLE 2 Coauthorship networks' number of nodes and edges, as well as their density and diameter

	n_{nodes}	n_{edges} [a]	Density[b]	Diameter[c]	$n_{components}$	$n_{articless}$ [d]
Entire network						
1998–2020	1885	2868	.0016	8	474	894
1998–2010	154	194	.0165	4	43	99
2011–2014	408	534	.0064	7	114	188
2015–2018	724	973	.0037	6	220	289
2019–2020	870	1346	.0036	5	243	318
Largest component						
1998–2020	193	458	.0247	8	1	166 (18.6%)
1998–2010	39	83	.1120	4	1	46 (46.5%)
2011–2014	66	117	.0545	7	1	45 (23.9%)
2015–2018	58	146	.0883	6	1	23 (8.0%)
2019–2020	43	100	.1107	5	1	21 (6.6%)

[a]Unweighted.

[b]Undirected graph.

[c]Unweighted, longest diameter.

[d]Percentages indicate the share of articles by authors in the largest components relatively to the total number of articles.

4.2 | Publication year

Until 2005, CLT-related research remained scarce with a maximum of two publications per year. However, that time period contains two articles that pioneered CLT, namely Trope and Liberman's (2003) conceptual paper on TCT and their first paper on the construal level's effects on desirability and feasibility concerns (Liberman & Trope, 1998). The following years witnessed a considerable increase in publications (Figure 2), particularly after Trope and Liberman's (2010) seminal review of CLT, with identifiable stages between 2010 (n = 25) and 2011 (n = 43), as well as between 2014 (n = 51) and 2015 (n = 70). Furthermore, CLT studies surged over the last 2 years, 2019 (n = 132) and 2020 (n = 186, including 35 early access articles). Based on these patterns, we consider four time periods for our subsequent author analysis: From 1998 to 2010 (n = 99), from 2011 to 2014 (n = 188), from 2015 to 2018 (n = 289), and from 2019 to 2020 (n = 318, including 35 early access articles).

4.3 | Author analysis

We extracted coauthorship networks to illustrate the formal relationships between authors. In these networks, the nodes refer to the authors, their size to the degree centrality measure (i.e., the total

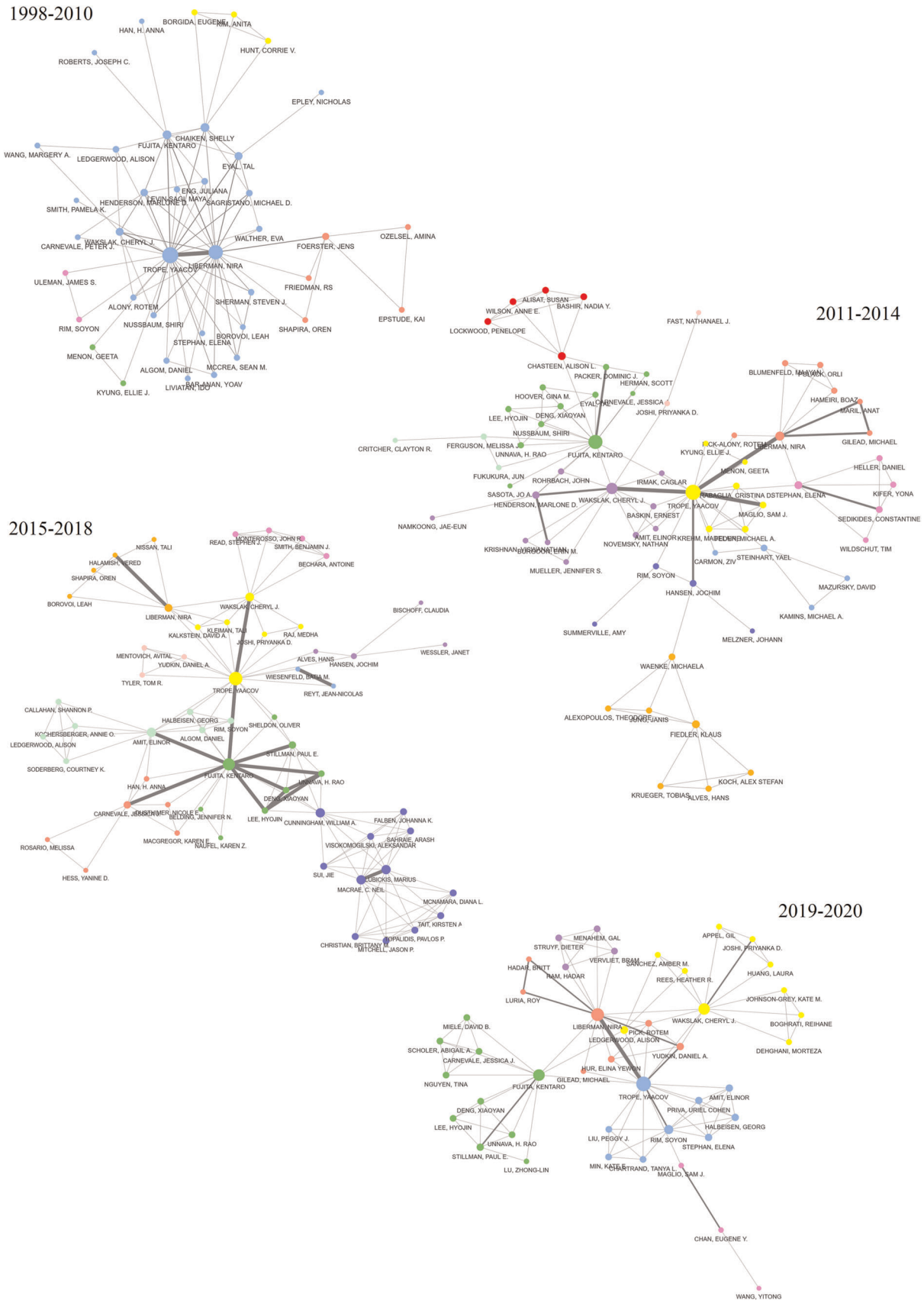

FIGURE 3 Largest components of coauthorship networks per time period

TABLE 3 Top 10 authors according to total citations and network centrality (we provide detailed statistics in the Supporting Information)

Author rank	Total citations	Degree centrality	Betweenness centrality
1	Trope, Yaacov	Trope, Yaacov	Trope, Yaacov
2	Liberman, Nira	Liberman, Nira	Fujita, Kentaro
3	Fujita, Kentaro	Fujita, Kentaro	Liberman, Nira
4	Wakslak, Cheryl J.	Wakslak, Cheryl J.	Cunningham, William A.
5	Sagristano, Michael D.	Kardes, Frank R.	Wakslak, Cheryl J.
6	Henderson, Marlone D.	Macrae, C. Neil	Chasteen, Alison L.
7	Foerster, Jens	Eyal, Tal	Hansen, Jochim
8	Eyal, Tal	Amit, Elinor	Eyal, Tal
9	Smith, Pamela K.	Golubickis, Marius	Macrae, C. Neil
10	Levin-Sagi, Maya	Rim, Soyon	Stephan, Elena

number of coauthorships per author; Newman, 2010), and their color to their cluster membership. Edges connecting two authors display coauthorships, while the edge weight refers to the number of co-authored articles. Table 2 indicates the properties of the entire network and of the largest component (i.e., the network component comprising the most authors) per time period.

The number of authors increased from 154 in the 1998–2010 period to 408 in the 2011–2014 period, to 724 in the 2015–2018 period, and finally to 870 in the 2019–2020 period. In addition, the number of coauthorships and components in the entire network similarly increased over the years. Accordingly, from the first to the fourth period, the network's density (i.e., proportion of realized on possible edges) decreased from 1.63% to .64%, .37% and finally .36%, respectively, which is similar to bibliometric analyses in other fields (e.g., Hu et al., 2018; Khan & Wood, 2016). This sparsity is due to the large number of small components that mainly represent single co-authored papers. Larger components that refer to larger researcher groups are rare. Specifically, during each time period, the networks include one very large component comprising considerably more authors than the other components.

From the first to the second time period, the largest component (Figure 3) grew from 39 to 66 authors, with 83 and 117 coauthorship ties, respectively. This growth implies a decrease in density from 11.2% to 5.5%. However, the component's size decreased in the third (to 58 authors with 146 coauthorships, density = 8.8%) and fourth time periods (to 43 authors with 100 coauthorships, density = 11.1%). The number of articles written by the authors of the largest component decreased from 46 to 45, 23, and 21 in first to fourth time periods, respectively; a decrease that corresponds with a share of 46.5%, 23.9%, 8.0%, and 6.6% of the overall number of articles per time period, respectively.

In each time period, the largest component includes CLT's seminal authors, namely Yaacov Trope (60 articles), Nira Liberman (46 articles), Kentaro Fujita (26 articles), and Cheryl Wakslak (25 articles). The last three authors are former Ph.D. students at the Trope Lab, who presently maintain labs and research groups at the Tel Aviv University (Nira Liberman), the Ohio State University (Kentaro Fujita), and the University of Southern California (Cheryl Wakslak). These authors and their lab members form the intellectual and conceptual base of CLT's preservation and advancement. Yaacov Trope, Nira Liberman, Kentaro Fujita, and Cheryl Wakslak account for 106 articles in our data set (11.9%), and the top ten most-cited papers per year are authored by them or by researchers affiliated with them. Moreover, the authors' high citation counts and their central network positions (Table 3) confirm their high productivity and prominence.

By clustering the authors within the largest components per time period, we find that one central cluster dominates the first period, as evidenced by the low modularity score ($mod_{1998–2010} = .12$, $n_{clusters} = 5$). This cluster comprises 27 authors, including the four core authors with Trope and Liberman in central positions. From the second time period onward, the four core authors form distinct components as they shape their own field of expertise within CLT-related research and build and sustain their own labs. This dispersion is also evident in the much denser clustering structure of the later time periods ($mod_{2011–2014} = .66$, $mod_{2015–2018} = .58$, $mod_{2019–2020} = .59$).

A detailed analysis of the second time period's graph shows that the increasing dispersion results from the establishment of distinct research groups, with each author being linked to at least one of the four core authors by at most two steps. As an exception, Jochim Hansen, a former post-doctoral fellow at New York University under Yaacov Trope, constitutes a bridging author who links a group of European researchers, including Michaela Wänke (University of Mannheim, Germany) and Klaus Fiedler (Heidelberg University, Germany), to the core authors' network component. During the time period thereafter, William A. Cunningham, a former colleague of Kentaro Fujita at Ohio State University, extended this network by linking a group of researchers from Aberdeen University, Scotland whose work deals with future-directed thought. By contrast, the graph of the last time period (2019–2020) does not (yet) contain such extensions.

Overall, these results indicate a prominent group of interconnected authors (largest component) whose collective studies played a predominant role in CLT's early advancement and who have since continuously shaped the field. With the field's emerging maturation, unconnected authors, who gained increasing relevance and published most of the research on CLT, reduced the prominent group's share of articles. Despite this trend, the initial authors remained the largest group of interconnected authors, suggesting a stable core of researchers.

4.4 | Keyword analysis and topic modeling

The pre-processing of the articles' keywords produced 982 terms for the keyword and topic analysis. Figure 4 illustrates the results of the keyword analysis, indicating each term's frequency (*x*-axis) and rank

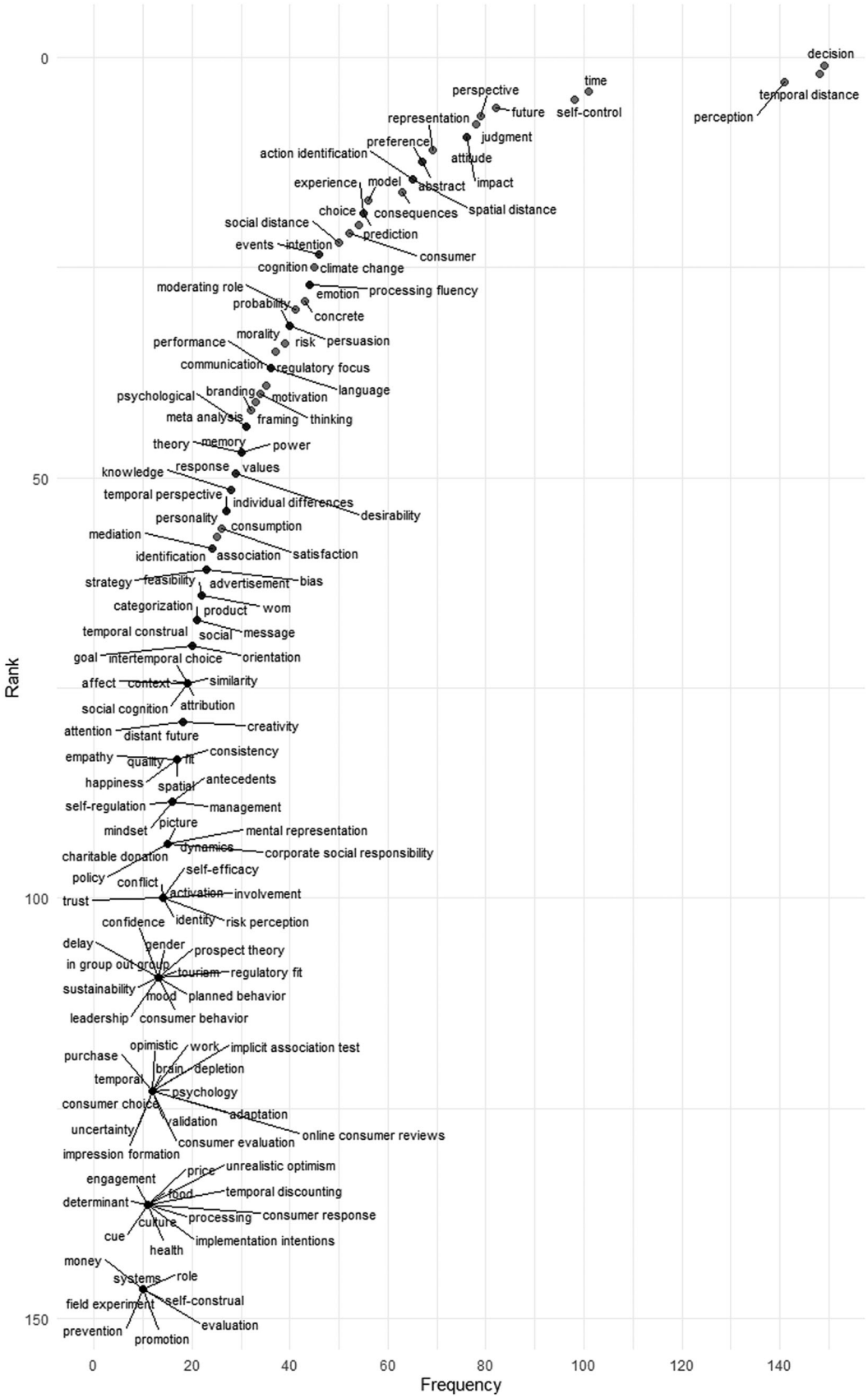

FIGURE 4 Term frequency and term frequency rank of terms used 10 or more times

TABLE 4 Topic clusters (TC) with the top 10 terms, silhouettes, trend, and R^2 (term wordings as used in the analysis)

Topic cluster analysis			Trend analysis	
TC	**Top 10 terms**	**Silhouette**	**Trend**[a]	**R^2**
TC 1	Adaptation, climate change, mitigation, public engagement, engagement, personal experience, proenvironmental behavior, risk perception, policy support, support	0.492	↑***	.741
TC 2	Leadership, transformational leadership, charismatic leadership, work, transactional leadership, vision, virtual teams, geographically dispersed teams, integration, intrinsic motivation	0.453	→	.097
TC 3	Fit, congruence, advertisement, promotion, processing fluency, prevention, advertising effectiveness, regulatory fit, persuasion, regulatory focus	0.419	↑**	.503
TC 4	Wom, online consumer reviews, trust, service failure, online, customer satisfaction, e-wom, e-commerce, reviewer, consumer reviews	0.365	↑***	.851
TC 5	Feasibility, consumer choice, context effects, compromise, satisfying and maximizing mind-set, variety, alternatives, desirability, trade-offs, attribute-based	0.356	→	<.001
TC 6	Natural-gas, fracking, energy development, public attitudes, shale gas, unconventional oil and gas, public acceptance, coverage, Pennsylvania, United States	0.340	↑*	.465
TC 7	Money, intertemporal choice, delay, immediacy, utility, loss aversion, behavioral decision making, gratification, certainty, temporal discounting	0.326	↓.	.301
TC 8	Likelihood, mental, probability, categorization, subjective probability, egocentricity, events, processing style, time-perception, representation	0.323	↓**	.660
TC 9	Morality, past behavior, dog, deontology, consistency, political conservatism, negotiation, religion, flexibility, concerns	0.321	↓**	.552
TC 10	Confidence, planning fallacy, optimistic, accuracy, fallacy, overconfidence, task duration, illusion, unrealistic optimism, metacognition	0.297	↓**	.507
TC 11	Sustainability, corporate social responsibility, involvement, motives, green, cause related marketing, green consumerism, organic food, identity, social norms	0.291	↑***	.724
TC 12	Sex differences, shift, embodiment, processing bias, expression, verbalization, style, face recognition, precedence, autism	0.284	→	.002
TC 13	Temptation, impulsivity, body-mass, self-regulation, ego-depletion, eating behavior, smoking, temporal orientation, future consequences, depletion	0.244	↓**	.502
TC 14	Education, protection motivation, fear appeals, self-efficacy, health, information security, perform, socio-scientific issue, prospect theory, campaign	0.196	↑**	.590
TC 15	Brain, (f)mri, language, default mode network, implicit association test, theory of mind, hierarchical organization, neuroscience, linguistic category model, mental time travel	0.183	↓**	.587
TC 16	Well-being, depression, volunteering, happiness, mindfulness, prosocial behavior, life satisfaction, ethics, unethical, dishonesty	0.167	→	.042
TC 17	Impression formation, creativity, category accessibility, attention, sexual desire, insight, eeg, interpersonal relationships, love, priming	0.045	↓***	.725
TC 18	Fair, group identification, organizational justice, social identity, in-group out-group, physical attractiveness, stereotype, group, intergroup bias, procedural justice	0.035	→	.012

[a]See Supporting Information (https://osf.io/wukfd/) for detailed statistics; ↑ = positive slope, ↓ = negative slope, → = stable slope ($p \leq .1$; ***$p \leq .001$, **$p \leq .01$, *$p \leq .05$, '.'$p \leq .1$)

(*y*-axis). A large number of terms relate to time (e.g., "temporal distance," "time," and "future"), emphasizing the relevance of time-related research in CLT with its origins in TCT. Terms relating to social (e.g., "social distance," "power," and "social cognition"), spatial ("spatial distance"), and hypothetical distance (e.g., "risk," and "probability") are less frequent. This result points to a pronounced asymmetry in the distance types used in CLT-research (see also Soderberg et al., 2015), which reaches beyond research focusing on the distance-construal link.

Other prominent terms refer to general cognitive functions (e.g., "judgment," "attitude," and "prediction") and decision making (e.g., "decision," "preference," and "choice"). Terms related to more automatic procedures (e.g., "processing fluency," "language," "implicit association test") appear less frequently. Another large proportion of terms is directly related to consumer psychology and marketing (e.g., "branding," "consumption," and "advertisement"). Displaying CLT's intellectual origins, "action identification" (Vallacher & Wegner, 1989) also occupies a prominent position. Other salient terms, which underline CLT's implications for behavioral regulation, relate to motivation and self-regulation (e.g., "self-control," "goal," and "self-regulation"), as well as to "emotion."

Finally, the results show that CLT is linked to other influential theories like "regulatory focus" theory (Higgins, 1998) and "prospect theory" (Kahneman & Tversky, 1979). Linkages to other theories, such as "fuzzy-trace theory" (Reyna, 2004) and "self-determination" theory (Deci & Ryan, 2000) also occur, although less frequently.

In a final step, we submitted the terms to an LDA. Our analysis considered solutions with 10 to 30 clusters, the average stability of which we examined by using the silhouette measure of cohesion and separation (Kaufman & Rousseeuw, 2005). The average silhouette values range from 0.248 for 28 to 0.351 for 10 topic clusters, indicating fuzzy clustering solutions. We chose an 18-cluster solution (silhouette = 0.283) to balance the stability and level of detail.

Table 4 and Figure 5 show the top 10 terms per topic cluster (TC), the silhouette values, and a linear trend, thus indicating the topic's relative (as opposed to absolute) growth or shrinkage. Owing to the comparatively low number of publications before 2009, we restricted the analysis to the time period from 2009 to 2020.

The analysis shows several topic clusters on consumer research. Most notably, TC 3 refers to advertising effectiveness and regulatory focus (e.g., "advertisement," and "regulatory fit"), whereas TC 4 includes terms on customer satisfaction ("trust," and "service failure") and (online) communication between consumers (e.g., "wom," and "online consumer reviews"). Both of these TCs have witnessed an increase in relative research interest over the years. In contrast, interest in TC 5, covering consumer decision making (e.g., "consumer choice") and corresponding processes (e.g., "compromise," and "trade-offs"), has stagnated. Related research areas that gained momentum refer to "sustainability," "green consumerism," and "corporate social responsibility" (TC 11), which feature prominently in consumer research (e.g., Trudel, 2018; White et al., 2019). Similarly, research linking CLT to "climate change" and "public engagement" (TC 1) gained considerable attention over the past years. The same applies, albeit to a lesser extent, to research on "energy development," especially "fracking" (TC 6).

We furthermore identify several topic clusters on psychological distance. For example, TC 7 deals with intertemporal, especially money-related concepts (e.g., "temporal discounting"), while TC 10 covers future prediction accuracy, especially overly positive predictions (e.g., "planning fallacy," and "overconfidence"). Our analysis indicates a decrease in relative research interest in these topic clusters, pointing to a shift away from this classic area of CLT research. TCs 17 and 18 demonstrate a link to social distance in terms of "interpersonal relationships" and "impression formation" (TC 17), as well as group-related concepts (TC 18). Similar to temporal distance-related TCs, research interest in these topics has recently decreased (TC 17) or stagnated (TC 18). TC 8 reflects hypothetical distance, covering terms such as "likelihood" and "(subjective) probability," but also comprises more general concepts such as "categorization" and "time perception." Research interest in these topics has clearly declined in recent years. Notably, none of the 18 TCs refers to spatial distance, which indicates the need for more interconnected spatial distance research.

Furthermore, our analysis reveals a topic cluster on self-regulation (TC 13) with a focus on health-related behaviors (e.g., "eating behavior" and "smoking"), and another topic cluster (TC 15) with a focus on "neuroscience" (e.g., "brain" and "(f)mri") and automatic processes such as implicit associations and language use. Moreover, we identify a topic cluster on "morality" and political attitudes (TC 9), and a conceptually related topic cluster on societal and individual well-being (TC 16) that covers terms such as "ethics" and "prosocial behavior," as well as individual "well-being" and "depression." Research interest in these topics has either stagnated (TC 16) or clearly decreased in recent years (TCs 13, 15, and 9).

Lastly, our analysis yields two residual topic clusters (TCs 12 and 14), covering a range of concepts. Although TC 14 can partly be linked to self-protection behaviors, TC 12 exhibits a mix of topics on, for example, gender differences and "face recognition." These residual topics clusters are a common phenomenon in LDA (e.g., Mimno et al., 2011) and should be discarded from the analysis (Maier et al., 2018).

To summarize, research linking CLT to applied consumer research (TCs 3, 4, and 5), as well as research on sustainability and climate change (TCs 1, 6, and 11) generally experienced a growing interest over the past years. In contrast, classic CLT research areas such as distance-related effects (TCs 7, 8, 10, 17, and 18), self-regulation (TC 13), and automatic processes and neural correlates (TC 15) generally lost momentum. These patterns of relative decline and increase in research interests indicate a relative shift from classic areas of CLT-related research to applied research.

5 | DISCUSSION

5.1 | Current state of the research field

Over the past 20 years, CLT-related research has grown extensively as evidenced by an increasing number of publications and author

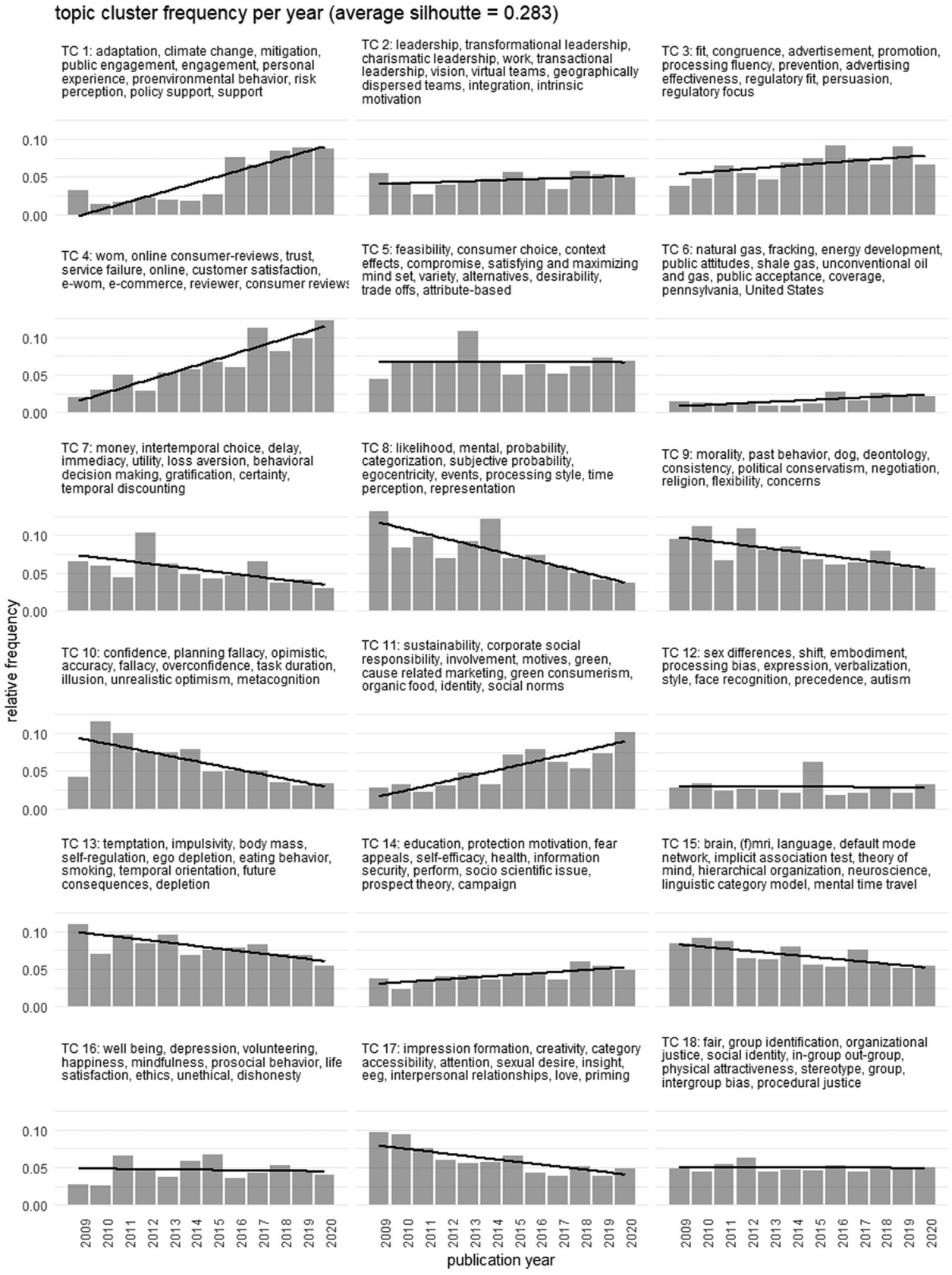

FIGURE 5 Relative topic frequency and linear trend from 2009 to 2020

groups that apply and extend the theory to foster our understanding of cognition and behaviors. As part of this massive increase in research interest, CLT's scope has broadened significantly, spanning numerous disciplines and explaining a wide range of human behaviors. By extending prior reviews and meta-analyses (e.g., Liberman & Trope, 2014; Soderberg et al., 2015), our bibliometric analysis offers an overarching picture of CLT-related research and discloses research topics and trends that emerged during the past twelve years of research in the field.

Not surprisingly, our analysis identifies Yaacov Trope, Nira Liberman, Kentaro Fujita, and Cheryl Wakslak as the most prominent authors involved in CLT research. These authors form the core of a large component of researchers that drives and preserves CLT-related knowledge. However, the share of publications by authors not connected to this largest component increased over the past years, emphasizing CLT's increasing relevance and maturity.

On the whole, our analyses suggest an expansion of CLT research into more interdisciplinary and applied contexts. This expansion originates from a stable, well-connected core of prominent authors, who predominantly preserve and advance fundamental research on CLT. Although these authors' high level of connectedness allows for fast and lasting information flows, the increasing number of authors in the entire network has led to prolonged information pathways, as evidenced by lower densities and increased diameters, putting the field in danger of information loss—especially in the applied research contexts. Despite the challenges arising from greater network fuzziness, exploiting new concepts, perspectives, and methodologies harbors a considerable number of opportunities to advance CLT and its applications in the face of and in response to contemporary challenges.

Specifically, our analysis underlines CLT's increasing relevance for applied research spanning consumer psychology and marketing, as well as sustainability and climate change. At the same time and relatively speaking, we find stagnating or even decreasing interest in several seminal topic clusters and clusters spanning different research fields and disciplines.

5.2 | Theoretical implications and future directions

Our analysis not only identified topic clusters that characterize prior CLT-related research but also disclosed six paths for future research (Figure 6).

In line with CLT's basic assumptions, our analysis identifies research on psychological distances' effects (TCs 7, 8, 10, 17, and 18) and research on construal's correlates to neural and automatic processes, including language (TC 15) as the dominant areas of fundamental CLT research. However, despite previous calls for more equally distributed research on psychological distance dimensions (Soderberg et al., 2015), there is no topic cluster on spatial distance and only a single topic cluster that we can link to hypothetical distance (TC 8). Consequently, we encourage resolving this asymmetry by means of distance research that can reveal the diverse effects of distance dimensions (*research path #1*). For example, Han and Gershoff (2018) show that dimension-associated controllability influences downstream distance perceptions. Moreover, regarding the construal level, recent research questions distance exchangeability. Although Sanchez et al. (2021) found additional evidence of the link between construal and temporal distance, Calderon et al. (2020,

		Fundamental research on CLT	Bridging fundamental and applied CLT research	Applied CLT research
Prominent research topics identified via topic modeling	Stronger focus on (implications for) the individual	Automatic associations, neural correlates, and language (TC 15) Psychological distance effects (temporal: TC 7 and 10, social: TC 17 and 18, hypothetical: TC 8, spatial: no TC identified)	Self-regulation and health behavior (TC 13)	Advertisement, word-of-mouth, and consumer choice (TC 3, 4, and 5)
			Well-being and prosocial behavior (TC 16)	Organizational behavior and leadership (TC 2) Sustainable consumption (TC 11)
	Stronger focus on (implications for) the society		Morality and political attitudes (TC 9)	Climate change (engagement) and energy production (TC 1 and 6)
Future research paths and implications		**Research path #1**: Resolve asymmetry in psychological distance research. **Research path #2**: Advance, formalize, and test neural representations and processes, as well as their link to behavior and especially language use.	**Research path #3**: Advance understanding on self-regulation and regulatory efforts. **Research path #4**: Unify research on (social) well-being, mental health, and human co-existence. **Research path #5**: Assess CLT's role for politics, societal understanding, and societal engagement.	**Research path #6**: Unify research on sustainability and climate change, (public) health, and politics to a framework linking CLT to societal challenges.

FIGURE 6 Conceptual overview of the topic cluster's position in CLT research and derived research paths

e27), after two failed replication attempts, "advise against treating likelihood as a psychological distance until further tests have established the relationship." Consequently, and tying in with Maglio (2020), we suggest emphasizing each dimension's unique characteristics, and explicitly testing the claim of exchangeability between distance dimensions.

Furthermore, by proposing a comprehensive model involving diverse *abstracta* and algorithmic modifiers to these *abstracta* (i.e., *predicators*), Gilead et al. (2020) promote an information-theoretical approach to the complex structures responsible for mental travel. Their framework opens up various research pathways on abstraction's neural background processes and offers a starting point for a more formalized mode of neuroscientific research. However, in light of other neurocognitive frameworks (e.g., on states of mind, Herz et al., 2020), more experimental research linking brain activity to observable behavior is vital for the integration and testing of these frameworks. Moreover, derived from our topic modeling results, the thematic link between brain activity and linguistic models calls for a structured integration of language in the aforementioned models (*research path #2*).

Although fundamental research on CLT inherently focuses on the individual's cognitive processes, applied research and research bridging fundamental CLT research with applied research are indicative of a higher societal focus. In applied CLT research, we not only find individual-focused topic clusters on marketing (TCs 3, 4, and 5), but also clusters on organizational psychology (TC 2), as well as sustainability, climate change, and energy production (TCs 1, 6, and 11), all of which incorporate societal issues. For example, CLT is a valuable vehicle to explain and predict preference shifts and behavioral inconsistencies (Liberman & Trope, 1998; Trope & Liberman, 2010) Therefore, the theory has implications for and can contribute to the design of effective interventions (Carrera et al., 2017; Fujita & Carnevale, 2012).

CLT has also been linked to research on self-regulation (TC 13; e.g., Fujita & Carnevale, 2012; Fujita & Han, 2009; Fujita et al., 2006), which has sparked considerable theoretical advancements. First, metamotivation (Fujita et al., 2019; Scholer et al., 2018) highlights the individual's awareness of and capability to influence motivational processes. Second, expanding CLT to regulatory scope theory, Trope et al. (2020) shed light on the processes and consequences accompanying the switch between low and high-level construal. These developments call for an extension of research beyond the current focus on (individual) health behaviors. Specifically, regulatory scope theory has implications for the balancing of global and local foci relating to individual versus societal interests, while metamotivational knowledge provides opportunities for behavioral intervention research (*research path #3*).

A specific topic cluster (TC 16) links CLT to research fields on well-being (e.g., Bruehlman-Senecal & Ayduk, 2015) and prosocial behavior, such as donation behavior (e.g., Ein-Gar & Levontin, 2013). Contemporary research, however, lacks a common framework unifying CLT's contribution to these research fields. The filling of this gap (*research path #4*) would provide useful groundwork for further research fostering (social) well-being and mental health, as well as human coexistence. Specifically, a common framework traversing individual and societal concerns could be grounded in research on interpersonal processes (Hess et al., 2018) and would integrate regulatory scope into process explanations of the implementation of prosocial behaviors. Similarly, by combining morality and political attitude research, TC 9 mirrors another research stream contributing to societal issues that require further attention (*research path #5*).

Finally, addressing ongoing calls for more societal and sustainably relevant as well as welfare-focused consumer research (Davis & Ozanne, 2019; Pham, 2013; Viglia, 2020), the previously described research paths (#3, #4, and #5) provide the building blocks to boost applied research's CLT use on societal issues (*research path #6*). However, despite the increase in applied research and domain-specific concepts such as the SHIFT framework for sustainable consumption (White et al., 2019), a unified framework and research agenda bridging all three research areas —that is, sustainability and climate change, (public) health, and politics—is absent in contemporary research.

Furthermore, it is evident that our analysis reveals several research areas affiliated with CLT that do not form a distinct topic cluster. Among these blind spots are, for example, research on affect and emotion, which has produced inconsistent results (e.g., Critcher & Ferguson, 2011; Williams et al., 2014), as well as the most recent advancements in CLT-related sensory research (Elder et al., 2017; Ruzeviciute et al., 2019; Sunaga, 2018).

5.3 | Limitations and data availability

Future research should not only explore the research paths that emerge from our bibliometric analysis but should also address its limitations. For example, while our clustering solution's silhouette measure confirms that the objects are generally well-matched with their own clusters compared to their neighboring clusters, some of them are subject to noise as they only cover loosely related topics in CLT research. Although we followed best practices in the field and tested for our results' stability (Cobo et al., 2011; Mantyla et al., 2018; Zupic & Čater, 2015), further explorations should revisit our analysis with different algorithmic options. Finally, future studies may also extend our analysis beyond the CLT scope by using the data and R code, which we have made available on the OSF platform at: https://osf.io/wukfd/ (see also Table A1 in the Appendix).

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

The R code and data can be accessed via the OSF platform at: https://osf.io/wukfd/. Moreover, we have deployed extensive parts

of our analyses in an interactive shiny web application (https://mktg.shinyapps.io/CLT_bibliometricAnalysis/).

Please also see Table A1 in the manuscript.

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APPENDIX

TABLE A1 List of Supporting Information available on the OSF (https://osf.io/wukfd/)

Element	Description
Bibliometric overview	Document with a basic summary of the bibliometric analyses in terms of the number of articles, authors, and journals
Author analysis[a]	Full tables with each author's number of publications and citations, as well as centrality measures for the coauthorship networks
	Network plots for the largest component and the entire coauthorship network
Topic analysis[a]	Solutions for 10 to 30 TCs
	Detailed statistics for the trend analysis and silhouette values
	Additional analysis of each author's and article's relevance (weights per TC)
	Identification of authors and articles that "bridge" two TCs (only in the shiny app)
Journal analysis[a]	Additional analysis of each journal's number of CLT-related publications and citations, as well as centrality measures in the citation networks that display information flows between journals
	Citation network plots
Data	Raw and final data files
R Code	R codes for the analyses
App data and code	R code and data necessary to run the app locally
Extended analyses	Full analysis (author, journal, and topic analysis) including journals ranked Q3 and Q4 in SCImago, as well as not ranked or not listed journals

[a]We provide customizable versions of these analyses in a shiny app (https://mktg.shinyapps.io/CLT_bibliometricAnalysis/). As the app's active hours per month are limited, we also provide the app's code on the OSF.