CHAPTER 7

Summary and General Discussion

In a world where time is ubiquitous, scientists have extensively investigated many aspects related to time, including how it is cognitively represented, talked about, and how it shapes lives and societies. These inquiries have provided several key insights: (a) the representation of time is grounded in the representation of space (Boroditsky, 2000; Boroditsky & Ramscar, 2002; Casasanto & Boroditsky, 2008; Casasanto, Fotakopoulou, & Boroditsky, 2010; Lakoff & Johnson, 1980; Miles, Karpinska, Lumsden, & Macrae, 2010); (b) different cultural and/or linguistics groups use different spatializations of time to think and talk about time (Bender & Beller, 2014; Boroditsky, Fuhrman, & McCormick, 2011; Boroditsky & Gaby, 2010; de la Fuente, Santiago, Roman, Dumitrache, & Casasanto, 2014; Núñez, Cooperrider, Doan, & Wassmann, 2012); and (c) the different spatializations of time are psychologically meaningful in the sense that they are related to psychologically relevant variables (Duffy & Feist, 2014; Duffy, Feist, & McCarthy, 2014; Hauser, Carter, & Meier, 2009; Lee & Ji, 2014; Margolies & Crawford, 2008; McGlone & Pfiester, 2009; Richmond, Wilson, & Zinken, 2012; Ruscher, 2011). This dissertation was aimed at advancing knowledge on time spatializations through the pursuit of four more specific objectives that are at the juncture of these insights:

1. This dissertation integrated insights on how culture shapes cognition and behavior that have arisen out of the cross-cultural work cataloguing the different spatializations of time, with insights stipulated by a prominent theory within psychology, the culture-as-situated-cognition (CSC) approach. The CSC approach centers on the documented variation in regards to the individualism-collectivism dimension and recent discoveries into the situated and dynamic nature of culture.
2. This dissertation investigated the temporal stability of two specific time spatializations, the ego- and time-moving representation. Within the ego-moving representation, time is conceptualized by having the self move along a timeline; within the time-moving representation, time is conceptualized by having temporal events approach and pass by a stationary self. By investigating the temporal stability of these two representations, this dissertation juxtaposes literature that highlights the dynamic and situated nature of the spatializations with literature that treats these spatializations as cultural or individual difference variables.
3. This dissertation investigated the relation between the ego- and time moving representations and key cultural variables, namely future orientation, self-concept, and agency.
4. This dissertation investigated whether previously documented relations between the ego- and time-moving representations and future orientation, agency, and event valence amongst English-speaking participants, generalize to different cultural and/or linguistic groups.

Below, a summary and discussion of the key theoretical and empirical insights emerging from this dissertation is provided. The implications for future research and the limitations of this dissertation are discussed before providing concluding statements.

SUMMARY OF THE RESEARCH FINDINGS

Chapter 2 integrated insights provided by the CSC approach with research on the cultural variation in the representation of time to advance knowledge about how culture, cognition, and behavior interact. In doing so, it tested the three main premises of the CSC approach regarding culture outside of the much investigated individualism-collectivism domain and generated several novel research ideas. The first premise – which posits that culture provides a mechanism to solve universal problems with cultural variation arising as there are multiple solutions possible which address these problems in different ways – is largely supported by research on cultural variation in time representation. The two fields have focused on a completely different (universal) problem though, and consequently the two fields provide different insights regarding the origin of culture variation and transference of culture across generations. Namely, the CSC approach has focused on the problem of people needing to co-exist and even cooperate in order to survive. Individualism or collectivism arose out of different ecological niches as ways through which identity, values, motivation, and cognitive processes are streamlined to facilitate co-existence within groups. On the other hand, research on cultural variation in time representation has shown that different cultures have each found different ways to represent the abstract domain of time, with drivers like language, temporal orientation, and writing systems propagating these different ways from one generation to the other. The second premise – which operationalizes culture as situated and dynamic mindsets – is also largely supported by research on cultural variation in the representation of time. Similar to individualistic/collectivistic differences vis-à-vis identity and cognition, which are typically explored within the CSC approach, different spatializations of time seem to be much more flexible and contextually dependent than research documenting cross-cultural differences would perhaps suggest. Cultural researchers working with the CSC approach or on the representation of time have both started to make use of this flexibility experimentally, making it possible to move beyond a description and classification of cultural differences and instead test for causal mechanisms underlying cultural variation and the downstream consequences of the different cultural varieties. The third premise – which operationalizes culture as something which provides its members with cultural expertise so members know what to expect in most situations and can consequently rely on associative reasoning most of the time to get by – is only preliminary supported

by research on cultural variation in the representation of time. Namely, research in this area has shown that a switch-cost is observed when people are confronted with different spatializations. However, investigations in whether different spatializations can induce disfluency, with the associated consequences for systematic reasoning, and vice versa, whether a switch-cost can be observed when people are confronted with individualistic and collectivistic content, is lacking in order to truly say culture is operationalized similarly within the CSC approach and within research on (cultural) variation in time representation in regards to this premise.

The temporal stability of the ego- and time-moving representations was tested in Chapter 3 amongst New Zealand participants. Participants responded to an ambiguous time question (Boroditsky, 2000; Gentner, Imai, & Boroditsky, 2002; McGlone & Harding, 1998; Rothe-Wulf, Beller, & Bender, 2015), which gauged the ego- and time-moving representations, twice over a 5-month interval. Results indicated that participants from New Zealand use both the ego- and time-moving representations to think about time, that there is overall stability in answers to the ambiguous time question, with observed over-time change being due to female participants shifting their answers from a time-moving consistent response to an ego-moving consistent response. An important contribution of Chapter 3 is that it integrated research that highlights the dynamic and situated character of the representations with literature that treats these representations as cultural or individual difference variables. The research presented in Chapter 3 is also, to our knowledge, the first research to report on time representation amongst New Zealand participants and on a gender effect vis-à-vis time representation.

The relation between the ego- and time-moving representations and key cultural variables, namely future orientation, self-concept, and agency, was investigated in Chapter 3, Chapter 4, and Chapter 5. Chapter 3 investigated the relation between the ego- and time-moving representations, gauged by an ambiguous time question, and future orientation, gauged by the future subscale of the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) and the 14-item version of the Consideration for Future Consequence scale (Joireman, Shaffer, Balliet, & Strathman, 2012), using a longitudinal design (see above). Participants adopting an ego-moving representation did not score higher on future orientation than participants adopting a time-moving representation. Chapter 4 investigated the relation between the ego- and time-moving representations and self-concept amongst Dutch and English-speaking participants across six experiments. Two experiments employed correlational research designs utilizing different measures of self-concept and the ego- and time-moving representations. Three experiments employed experimental research designs and manipulated self-concept between participants using different tasks.

The last experiment also employed an experimental design but manipulated time representation between participants. Across experiments, no proof for a relation between self-concept and the ego- and time-moving representations was found. In Chapter 5, the relation between the ego- and time-moving representations and agency was investigated with three experiments. Two experiments, using English and Dutch speakers, employed an experimental design and manipulated agency between participants using an autobiographical recall task (Fisher & Johnston, 1996). One experiment, employing Dutch speakers, employed a correlational design and investigated whether participants responding to an ambiguous time question with an ego-moving consistent response, scored higher on personal agency, gauged with Levenson's Locus of Control questionnaire (Levenson, 1972, 1973; Presson, Clark, & Benassi, 2001), than participants responding with a time-moving consistent response. Amongst English speaking participants, inducing feelings of personal agency led to the adoption of an ego-moving representation. This study was thereby the first to directly explore the causal mechanism underlying the relation between agency and the ego- and time-moving representations. Amongst Dutch speaking participants, no relation between agency and the two time representations was observed. Through exploring these relations amongst different cultural and/or linguistic groups, Chapter 3 and Chapter 5 simultaneously contribute to the fourth objective of this dissertation.

Chapter 3, Chapter 5, and Chapter 6 investigated the extent to which previously documented relations between the ego- and time-moving representations and future orientation (Richmond et al., 2012), agency (McGlone & Pfiester, 2009; Richmond et al., 2012), and event valence (Margolies & Crawford, 2008; McGlone & Pfiester, 2009) obtained amongst American and/or British participants, generalize to other cultural and/or linguistic groups. As mentioned before, Chapter 3 investigated the relation between the two time representations and future orientation amongst New-Zealand participants. In Chapter 5 and Chapter 6 the relations between the two time representations and agency, and between the two time representations and event valence, was investigated amongst Dutch participants. In Chapter 6, event valence was manipulated between participants before measuring time representation using different time representation questions. Across these chapters no proof for a similar relation between the variables of interest and the ego- and time-moving representations could be found. Especially the null findings reported in Chapter 5 and Chapter 6, vis-à-vis agency and event valence, seem to suggest that the relations between certain time representations and psychological variables might be culturally idiosyncratic, considering that the research design used closely mimicked the research design used amongst English speaking participants and the fact that the direct and indirect evidence in favor for such a relation amongst English speaking participants is substantial (Duffy & Feist, 2014; Hauser et al., 2009; Lee & Ji, 2014;

Margolies & Crawford, 2008; McGlone & Pfiester, 2009; Richmond et al., 2012; Ruscher, 2011). In both chapters, when time representation was gauged using the ambiguous time questions, findings indicated that Dutch participants had a strong preference for the time-moving representation, making it likely that the flexibility provided by linguistic convention is a prerequisite for different time representations being linked to psychological variables like agency and event valence. Although the findings from Chapter 3 do not oppose the interpretation that cultural and/or linguistics factors might drive the discrepancy in results and affect the relations between certain time representations and psychologically relevant variables - New Zealand participants also seemed to prefer the time-moving representation more than American and/or British participants – other possibilities should be considered as well. First, the design used in our study slightly differed from the design used by Richmond et al. (2012). Moreover, the direction of results we found is in line with findings from associated literature. Namely, this literature shows that the ego-moving representation is related to procrastination, lower conscientiousness and tardiness, whereas a future orientation is negatively related to procrastination, with future orientated individuals being more likely to be conscientiousness and punctual (Duffy & Feist, 2014; Duffy et al., 2014; Zimbardo & Boyd, 1999). The nomological net of time representations and future orientations thus suggest that the previously reported relation between an ego-moving representation, compared to a time-moving representation, and higher future orientations should be reconsidered.

Integration of Research Findings, Implications for Future Research, and Limitations of This Dissertation

By taking a cross-disciplinary approach and through the pursuit of the above outlined objectives, this dissertation crystalizes important insights that have, to date, been somewhat overlooked and/or largely confined within the boundaries of one of the two research areas dedicated to studying time spatializations or within the research area working with the CSC approach. These insights have relevance beyond the research area from which they are borne. Below, we discuss these implications and detail how they might inform future research working on time representation or, more generally, on the interaction between culture, cognition, and behavior. Furthermore, this dissertation has several (methodological) limitations that should not only be taken into consideration when interpreting the findings, but are also relevant to consider by researchers working on the representation of time and/or on the interaction between culture, cognition, and behavior, more generally. These are also discussed below.

Implications for Research on Cultural Variation in the Representation of Time: Culture Operates at Different Levels and Has Downstream Consequences

Even though research on the cultural variation in the representation of time has provided scientists with many interesting insights regarding the interaction between culture, cognition, and behavior, this area of research has mostly taken a comparative approach towards culture, seeing it as a constant that differs between cultural groups. Cross-cultural research with a somewhat descriptive approach dominates the field and the field thereby overlooks the other levels at which culture operates that have been described in psychological approaches towards culture, like the CSC approach. As we saw in Chapter 2, these other levels of culture are not incompatible with research on cultural variation in the representation of time and a more explicit recognition of these levels might be beneficial for the field in various ways.

For instance, culture has a universal function in the sense that it provides a functional solution to address certain universal challenges (Oyserman, 2011, 2015, 2017). Chapter 2 of this dissertation described that considering culture from this level provides one way to understand the cultural variation in spatializations of time and also provides a way to systemize this variation accordingly. This way of systemizing might, in turn, offer a good starting point from which to study cultural variation in time representation, a field that, sometimes, is still held back by a lack of consensus and integrative overlap (Núñez & Cooperrider, 2013; see Bender & Beller, 2014, though for an overview and attempt at integrating empirical and theoretical advances within the field).

Similarly, as described in Chapter 2 of this dissertation, and attested to by the large amount of research taking a social psychological approach to time representations (Boltz & Yum, 2010; Boroditsky & Ramscar, 2002; Duffy & Feist, 2014; Duffy et al., 2014; Hauser et al., 2009; Lee & Ji, 2014; Margolies & Crawford, 2008; McGlone & Pfiester, 2009; Richmond et al., 2012; Ruscher, 2011), time spatializations, like cultural mindsets, are situated, dynamic, and psychologically meaningful. This can be exploited experimentally to relate the cultural varieties of time spatializations to important psychological constructs and test for downstream consequences. As discussed in Chapter 2 of this dissertation, studies within research on the cultural variation in time spatializations doing this are still somewhat scarce, even though there are promising exceptions. For example, research by Casasanto and Bottini (2014) and Lai and Boroditsky (2013) used experimental manipulation to explore how writing direction and language affect which time representations are used to think about time. Similarly, de la Fuente et al. (2014) showed how a cultural factor like temporal focus affected the representation of time (see also Li, Bui, & Cao, 2018). By exploring the relation between the ego- and time-moving representations and future orientation,

self-concept, and agency in Chapters 3, 4, and 5 of this dissertation, we hope to have also contributed to knowledge about the flexibility of time representations, their psychological significance, and the relation they have with other cultural variables. As discussed in Chapter 2, however, several other research directions are still unexplored, for example into the relation between non-deictic vs. deictic time spatializations and cultural differences in relation to either causality or theory of mind, or into the relation between vertical vs. horizontal spatializations and cultural differences in temporal orientation. Future research in this direction would help in elucidating how cultural factors interact in or out of tandem to shape societies, cognition, and behavior.

Thirdly, culture also operates to unify practices within societies to allow for predictability (Mourey, Lam, & Oyserman, 2015; Oyserman, 2017). As is described in Chapter 2 as well, this level of culture is still unexplored within research on (the cultural variation in) time representation. Research on time representations has shown that there is a switch cost when participants are presented with different representation of time after one another (McGlone & Harding, 1998; Richmond et al., 2012). Moreover, more anthropological research has extensively documented the problems related to time that people experience when encountering different cultures (Brislin & Kim, 2003; Hall, 1959, 1966, 1983; Levine, 2006; Spradley & Phillips, 1972). However, future studies will need to explore whether dealing with culturally unexpected representation leads to cultural disfluency and consequently affects systematic reasoning (Mourey et al., 2015). Future studies could address this by, for example, following a similar research set-up as Mourey et al. (2015) but instead using culturally (un)expected time representations to manipulate cultural fluency.

Implications for the CSC Approach: Cultural Variation Beyond the Individualism-Collectivism Dimension

Conversely, theories within cultural psychology, like the CSC approach, have heavily focused on the subset of cultural differences that can be captured by the individualism-collectivism dimension, thereby neglecting to incorporate other research that documents important cultural variation that cannot be (best) explained by differences related to this dimension alone (Fiske, 1992; Gelfand et al., 2011; Levine, 2006; Majid, Bowerman, Kita, Haun, & Levinson, 2004; Medin & Atran, 2004; Schimmack, Oishi, & Diener, 2002; Schweder, 1991). For example, in their research, Majid, Bowerman, Kita, Haun, and Levinson (2004) showed that variation in spatial cognition does not relate to the individualism-collectivism dimension but rather can be attributed to linguistic differences. Moreover, in Chapter 4 of this dissertation, results were reported that showed that the ego- and time-moving representations were not linked to differences in self-concept, a key construct related to the individualism-collectivism dimension.

By recognizing and incorporating this research, and, for example, investigating which areas of cognition are linked to the individualism-collectivism dimension and which areas are not (and why this is the case), theories, like the CSC approach, could extent their application. This would perhaps also better equip theories like the CSC approach with ways of explaining how different cultural drivers, like self-concept or language, interact and how cultural differences are sustained and changed over time.

Implications for Research on the Psychological Significance of Different Time Representations: Language Matters

Another important implication for research on the psychological significance of different time representations, highlighted by the interdisciplinary approach taken within this dissertation, regards the fact that research on the psychological significance of different time representations has been almost exclusively done amongst speakers of English (e.g., Boltz & Yum, 2010; Boroditsky & Ramscar, 2002; Duffy & Feist, 2014; Duffy et al., 2014; Hauser et al., 2009; Lee & Ji, 2014; Margolies & Crawford, 2008; McGlone & Pfiester, 2009; Richmond et al., 2012; Ruscher, 2011; see de la Fuente et al., 2014, and Li, Bui, & Cao, 2018, for an exception). This in spite of the fact that the cross-cultural research on time spatializations has shown that different cultural and/or linguistic groups vary in which time spatializations they use to represent time (Bender & Beller, 2014; Boroditsky, 2001; Gaby, 2012; Lai & Boroditsky, 2013; Moore, 2011; Núñez et al., 2012; Rothe-Wulf, Beller, & Bender, 2015). Moreover, in discussing the findings, researchers often implicitly suggest that the relation between the different spatializations and certain psychological construct arise out of inherent, universal differences between the representations. As mentioned above, through the research reported in Chapter 3, Chapter 5, and Chapter 6 of this dissertation, we have taken a first step at actually investigating the question of the generalizability of the relation between certain representations of time and certain psychological constructs empirically. The findings reported in these chapters suggest that these relations do not necessarily translate across different cultural and/or linguistic groups with differences regarding the flexibility and/or preferences vis-à-vis time spatializations possibly playing an important role (see Rothe-Wulf et al., 2015 for results regarding spatial priming across three linguistic groups and discussion of the inconsistent findings across these groups). Future research regarding the relation between time spatializations and (other) psychological variables would thus be advised to carefully consider the cultural and/or linguistic make-up of their sample and how this affects the possible generalizability of their findings (see Henrich, Heine, & Norenzayan, 2010, for a more general discussion of this issue regarding pscyhological findings in general). Ideally, this research would always include different linguistic and/or cultural samples or be followed up by cross-cultural replications to allow for further

clarification on the generalizability of these effects and the ways in which cultural and/or linguistic factors moderate the relation between psychological variables and certain time representations.

Limitations

Spatializations of time other than the ego- and time-moving representations

Another insight that has also not been assimilated by research focusing on the psychological significance of the different time spatializations, and is also an important limitation of this dissertation, is the fact that there are many different spatializations of time, many more than just the ego- and time-moving representations. The ego- and time-moving representations were chosen as the two spatializations investigated in the empirical part of this dissertation, thereby following the research field that is focused on investigating the psychological significance of these two spatializations. This does, however, raise the question whether the insights highlighted by this dissertation regarding time spatializations are restricted to these two spatializations or also generalize to other spatializations.

One of the insights regarding time spatializations highlighted within this dissertation is the idea that time spatializations are not only linguistic and/or cultural artifacts but psychologically meaningful. The generalizability of this to other spatializations than the ego- and time-moving representations is supported by the (limited) literature in the cross-cultural domain that has investigated the future-in-front vs. past-in-front mappings and the left-to-right and right-to-left mappings (de la Fuente et al., 2014; Li et al., 2018; Maass, Pagani, & Berta, 2007; Maass, Suitner, Favaretto, & Cignacchi, 2009). Differences in the use of a future-in-front or past-in-front mapping have been linked to cultural differences in future orientation with past focused cultures preferring a past-in-front mapping over a future-in-front mapping (de la Fuente et al., 2014; Li et al., 2018). Differences in the spatialization of directionality (left-to-right vs. right-to-left) perpetuated by differences in writing and/or reading direction have, in turn, been implicated in stereotypical beliefs and action interpretation (Maass et al., 2007, 2009). In groups where directionality flows from left-to-right, agentic groups (men or younger people) are generally depicted to the left (by those who endorse the stereotype associating males and younger individuals with greater agency); in groups where directionality flows from right-to-left, these groups are depicted to the right (Maass et al., 2009). Analogously, in groups where directionality flows from left-to-right, the same athletic performance or aggressive act is interpreted as more forceful when the spatial trajectory of that action is from left-to-right; in groups where directionality flow from right-to-left, this is the case when the trajectory of that action is from right-to-left (Maass et al., 2007).

Another insight regarding time spatializations highlighted within this dissertation is the idea that the relation between spatializations of time and other psychological constructs might be culturally idiosyncratic and depend on linguistic convention. The generalizability of this to other spatializations than the ego- and time-moving representations cannot be similarly assumed, as evidence on this is still scarce. Cross-linguistic studies on horizontal and vertical temporal mappings in English and Mandarin speaking participants have, however, shown that Mandarin participants are influenced by vertical spatial primes where English participants are not (Boroditsky, 2001; Boroditsky et al., 2011). Although this does not constitute hard evidence regarding culturally idiosyncratic relation between certain spatializations and psychological constructs, the fact that spatial primes only affect the horizontal and vertical temporal representations when linguistic convention allows for both ways to think and talk about time, is at least supportive for this.

Another insight regarding time spatializations highlighted within this dissertation is the idea that even though spatializations might be driven by stable cultural or personality differences, they are also dynamic and situated. Although longitudinal research into the temporal stability of time spatializations other than the ego- and time-moving representations is lacking, the generalizability of this idea to other spatializations than the ego- and time-moving representations seems plausible considering the research that has demonstrated stable cross-cultural differences alongside effects on time spatializations of experimental manipulation. For instance, Lai and Boroditsky (2013) showed that the horizontal and vertical mappings used by Mandarin speakers is, in part, affected by which mappings the experimenter uses in the instructions to participants. Likewise, Casasanto and Bottini (2014) showed that the cultural variants of directionality, left-to-right vs. right-to-left, is not fixed according to conventional writing direction but can temporarily be reversed through experimental manipulation. Similarly, de la Fuente et al. (2014) showed that the future-in-front mapping, dominant in most cultures, can also be experimentally changed to a past-in-front mapping by making the past more salient through experimental manipulation.

In conclusion, even though more research is needed, the generalizability of the three insights highlighted by this dissertation regarding time spatializations, beyond the ego- and time-moving representation, seem to generally be in line with the literature.

The ambiguous time questions

A somewhat related limitation of this dissertation is the fact that the ambiguous time questions are perhaps too heavily relied on to gauge time spatializations, more specifically, to differentiate between the ego- or time-moving representations, even

though validity issues surround these questions. Namely, in all empirical chapters (2-6) of this dissertation, when gauging time representation, the ambiguous time questions were used. In Chapter 3, Chapter 4, and Chapter 5, we also relied on Margolies and Crawford's (2008) question for some of the studies. The event narratives were only used in Study 5 of Chapter 4. We did not observe a consistent relation between answers on the ambiguous time question and Margolies and Crawford's question: where in some studies answers were significantly related across these two measures, in other experiments they were not. The event narratives were not found to be related to either the answers to the ambiguous time questions or Margolies and Crawford's (2008) question. This inconsistency is also found in previous literature: where Richmond et al. (2012) report a significant relation between answers to the ambiguous time question and answers to Margolies and Crawford's (2008) question, Margolies and Crawford (2008) themselves find an inconsistent effect of event valence across the two questions. Margolies and Crawford (2008) suggest that their inconsistent findings vis-à-vis the effect of valence is perhaps due to the fact that the two questions tap into a slightly different construct: the representation of time vs. the representation of an event in space. In similar vein, we suggested that the event narratives in Chapter 4 might tap more closely into one's feelings of control over events. These ad hoc interpretations, however, do not solve all questions of validity though. Namely, even when considering it as explanation for observing a non-reliable relation between the measures (and an inconsistent effect of valence), one would still assume they would be related to some extent. The huge discrepancy observed in Dutch preference across the ambiguous time question and Margolies and Crawford's (2008) question challenges this however: where the ambiguous time question suggests a strong preference for the time-moving representation, Margolies and Crawford's (2008) question suggests around an even split. Consequently, we do not know for sure what the Dutch preference actually is – do they truly favor a time-moving representation over an ego-moving representation or actually use both to think and talk about time – and whether the ambiguous time question is a valid way to gauge cultural preference for either the ego-moving or time-moving representation. Perhaps the ambiguous time question actually triggers certain linguistic conventions in certain cultures, falsely giving the illusion that some cultures (strongly) favor one representation over the other? As insights regarding cultural preference for certain time spatializations (specifically the ego- and time-moving representation), and the role of culture in shaping the relation between spatializations and other psychological factors are dependent on having valid ways to measure the preferences for time spatializations, the employment of other measures alongside the ambiguous time questions and more research into the validity of these questions, is thus called for. This limitation should, of course, also be considered when interpreting the findings

of this dissertation. More anthropological and linguistic-centered studies offer some ideas of what sort of measures could be used. For example, McGlone and Pfiester (2009) used a corpus study to explore the frequency of the ego- and time-moving representations and their relation to valence in English. Dahl (1995) used interviews with Malagasy speakers to ask about their time representation directly. Furthermore, analysis of gestures are, for example, used by Núñez et al. (2012) to infer the uphill/downhill spatialization of the Yupno (see also Pederson et al. 1998, for the the director-matcher paragdigm to infer spatial frames of reference).

Cultural priming

A somewhat related issue that should also be considered both when interpreting the findings, and by future researchers more generally working within cultural and/or social psychology, concerns the experience we had with (cultural) priming. In Chapter 4, we relied on priming tasks in Study 3, Study 4, and Study 5 to induce an independent or interdependent self-concept and included measures of independence and interdependence after the time spatialization measures. In all three studies, we observed no effect of our manipulation on these measures of independence and interdependence. Although there are reasons to possibly explain this (two of the studies were conducted online and not in a controlled environment, and the time spatialization questions might have interfered with the measurement of interdependence and independence), it does suggest a critical examination of the priming methodology is called for. Although we in no way want to undermine the vast body of research that has used this methodology effectively to elucidate the flexibility of, for example, self-concept and exploit this to illuminate causal mechanisms underlying the relation between self-concept and other variables of interest (e.g., Aaker & Lee, 2001; Brewer & Gardner, 1996; Gardner, Gabriel, & Lee, 1999; Kühnen & Hannover, 2000; Kühnen, Hannover, & Schubert, 2001; Lee, Aaker, & Gardner, 2000; Mandel, 2003; for a meta-analysis on cultural priming tasks see Oyserman & Lee, 2008), our findings, the lack of an effect of our primes on self-concept measures, validate some of the current concerns within social psychology regarding priming and the replication crisis (Bower, 2012; Doyen, Klein, Pichon, & Cleeremans, 2012; Pashler, Coburn, & Harris, 2012; Rotteveel et al., 2015; see also Makel, Plucker, & Hegarty, 2012). Where others have talked about the dire need for conducting (direct) replication studies within psychology (Cesario, 2014; Dijksterhuis, 2013; Ioannidis, 2012; Pashler & Harris, 2012), we want to add to that in the case of priming, the inclusion of carefully selected and piloted manipulation checks are essential as well.

A last, related, issue touches on more general issues within psychology and science and deals with the handling of null results and the publication bias. Within psychology,

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and science in general, there is (still) a tendency towards primarily publishing positive findings. Although positive and consistent findings are understandably more 'exciting' and 'aesthetically' pleasing, this practice is highly problematic, hindering the progress of science immensely, as has also been eloquently discussed by others (Giner-Sorolla, 2012; Ioannidis, 2005, 2012; Pashler & Harris, 2012; Pashler & Wagenmakers, 2012). Efforts by some journals and individuals have began to turn the tide somewhat with initiatives like The Reproducibility Project, preregistration practices, the Open Science Framework, and the promotion of knowledge of different statistical techniques like Bayesian statistics, making strides towards resolving the 'the file drawer problem' and making science as a whole more open. With this dissertation we hoped to have been part of this development through making our data publicly available, through reporting on the null findings we sometimes found within the data, and by adding Bayes Factors. Nevertheless, continued efforts in this direction, including more preregistration as well, seem needed in order for science to flourish.

CONCLUSION

With this dissertation, we aimed to advance knowledge on time spatializations by taking an integrative approach. We pursued answers to questions that emerged when combining insights from more anthropological, linguistic and cognitive psychological studies on time spatializations with insights from cultural psychology and social psychological studies on time spatializations. Specifically, we found that in combining these approaches, several insights with multidisciplinary implications could be distilled. We also found proof for the temporal stability as well as situatedness of the ego- and time-moving representations. The ego- and time-moving representations were not found to be linked to the cultural variables future orientation (amongst New Zealand participants) and self-concept. They were found to be linked to agency but this was only the case amongst English speaking participants, not Dutch speaking participants. As the previously reported link between the ego- and time-moving representations and event valence could also not be replicated amongst Dutch participants, it becomes likely that the link between certain time representation and psychological variables is culturally idiosyncratic. Through communicating these findings, we hope that this dissertation serves as an inspiration for researchers working on time representation, and, more generally, on the interaction between culture, cognition, and behavior.