Journal of Psychology and Behavior Studies
ISSN: 2753-2364
DOI: 10.32996/jpbs
Journal Homepage: www.al-kindipublisher.com/index.php/jpbs

JPBS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Life is so Short, Future is so Long: The Relationship between Life History Strategies and People's Metaphorical Perspectives on Time

Yutian Qin

Faculty of Humanities, ELTE Eötvös Loránd University, H-1088 Budapest, Múzeum krt. 4., 6–8, Hungary; College of International Studies, Southwest University, No.2 Tiansheng Road, Beibei District, Chongqing, People's Republic of China

Corresponding Author: Yutian Qin, **E-mail**: 11592295@qq.com

| ABSTRACT

Accruing evidence has attested to the plasticity of people's metaphorical perspectives on the movement of events in time, which oscillate between the ego-moving perspective and the time-moving perspective contingent on, among others, perception of distance to the future by virtue of individual differences in lifestyle and personality. Building on and extending this avenue of inquiry, the current research investigated the relationship between life history strategy, another time-related construct, and the preferred perspective in the resolution of a temporally ambiguous question. Studies based on self-report (Study 1) and behavioral (Study 2) measures showed consistent results, such that individuals with a fast life history strategy and those who preferred the smaller-sooner reward tended to adopt the ego-moving perspective, whereas individuals with a slow life history strategy and those who preferred the larger-later reward tended to adopt the time-moving perspective. Examination of the priming effect of temporal perspectives on intertemporal decision-making revealed that differential perceptions of temporal distance underlay the strategy-time relationship (Study 3). Taken as a whole, the current findings suggested that individual differences in life history strategy may also influence people's preferred perspective in the interpretation of ambiguous language related to time.

| KEYWORDS

The ego/time-moving perspective, Life History Strategy, Temporal Distance, Intertemporal decision-making.

| ARTICLE INFORMATION

ACCEPTED: 01 June 2024 **PUBLISHED:** 18 June 2024 **DOI:** 10.32996/jpbs.2024.4.1.12

1. Introduction

The perception of temporal progression is an integral part of human experience (Wittmann, 2009). However, the incorporeity of time means that the apprehension of this abstract concept must depend on the more physically accessible and perceptually rich domain of space (Bender & Beller, 2014; Evans, 2004; Feist & Duffy, 2023a; Lakoff & Johnson, 1999; Majid, Gaby, & Boroditsky, 2013). Evidence from cross-linguistic studies testifies to the generality of the spatial conceptualization of time with cultural specificities (Feist & Duffy, 2023b). For example, although both English and Mandarin Chinese speakers mentally represent time along the front-back axis (Huang & Tse, 2017), English speakers tend to spatialize past at the back and future in the front, whereas the reverse pattern is found in Mandarin speakers (Gu, Zheng, & Swerts, 2019; Miles, Nind, & Macrae, 2010), among whom the idiosyncrasy of vertical spatialization of time is also noted (Fuhrman et al., 2011). In more dynamic depictions, temporal movement can be metaphorically represented either from the ego-moving perspective, whereby the observer (i.e., ego) is actively moving toward some stationary future event, or from the time-moving perspective, whereby a certain future event is moving toward the motionless observer (Clark, 1973; Lakoff & Johnson, 1980). Embodiments of these two antithetical spatial perspectives on time can be readily found in common linguistic expressions such as "We are coming up to the Lunar New Year" and "The Spring Festival is approaching us," respectively.

2. Literature Review

Such surface manifestations then raise the crucial question as to whether they have a deeper conceptual substratum, that is, whether, in addition to time being formulated from the dichotomous perspectives, it is also conceptualized in such terms (Boroditsky, 2000). In a foundational study designed to find out, Boroditsky (2000) first primed participants with the spatial scenarios using the ego-moving frame of reference (e.g., The dark can is in front of me.) or the object-moving frame of reference (e.g., The light widget is in front of the dark widget.) before presenting them with the original temporal disambiguation paradigm: "Next Wednesday's meeting has been moved forward two days" (McGlone & Harding, 1998). The task was to indicate the day on which the meeting had been rescheduled. The nucleus of ambiguity consists in the direction of "forward," whose movement can be bound to the past or the future depending on the temporal perspective adopted (McGlone & Harding, 1998). Specifically, forward movement from the time-moving perspective is oriented toward the past and accordingly, the adoption of this perspective translates into the meeting being brought earlier to next Monday. In contrast, forward movement from the ego-moving perspective is oriented toward the future and consequently, the adoption of this perspective translates into the meeting being put off to next Friday (McGlone & Harding, 1998). It was reasoned that if time is indeed grounded in space, then different spatial schemas should map onto different thoughts about time and result in different interpretations of the day of the rescheduled meeting (Boroditsky, 2000). Consistent with this reasoning, the results showed that spatial information entailed in the priming scenarios was automatically accessed in the processing of the subsequent temporal ambiguity, such that participants primed with the ego-moving-framed spatial scenarios gave more Friday responses and those primed with the object-moving-framed spatial scenarios gave more Monday responses, thereby validating that space and time are structurally similar on the conceptual level (Boroditsky, 2000: Study 1).

On the strength of this insight, a concatenation of research followed, demonstrating that factors of motion (Boroditsky & Ramscar, 2002; Matlock et al., 2011) and those grounded in motion (Duffy & Feist, 2017; Hauser, Carter, & Meier, 2009; Richmond, Wilson, & Zinken, 2012) can all exert a modulatory influence on the metaphorical perspectives on time. For example, in the resolution of the ambiguous "Next Wednesday's meeting" statement, reading and visualizing sentences that embedded fictive motion (e.g., The bike path runs alongside the creek), compared to the equivalents with no motion (e.g., The bike path is next to the creek) yielded a partiality toward Friday (in alignment with the ego-moving perspective) (Matlock, Ramscar, & Boroditsky, 2005). More recently, based on the finding that emotion can influence temporal perspective preferences (Richmond et al., 2012) and the fact that an approach-avoidance motivational system rooted in spatial motion is elemental to emotion (Lang, 2010), Zheng and collaborators (2019) found that being in an avoidance-motivated emotional state (i.e., anxiety) inclined participants toward the preference for the time-moving perspective.

One productive strand of extended inquiry germane to the current research concerns the roles individual differences play in modulating people's metaphorical perspectives on time. One study, predicated on the distinction that a present fatalistic time perspective involves a helpless and hopeless attitude toward life and the future, whereas a future time perspective entails active engagement in the pursuit of positive future goals and rewards, often at the expense of present enjoyment (Zimbardo & Boyd, 1999), Richmond and collaborators (2012) found that participants who adopted the ego-moving perspective scored higher in future time perspective whilst those adopted the time-moving perspective scored higher in present fatalistic time perspective (Study 2), suggesting the relationship between personal differences in time perspectives and the metaphorical representations of time. Building on this finding, Duffy and Feist (2014) examined the potential influence of individual differences in lifestyle on the perspectives taken in the interpretation of the temporal ambiguity. More specifically, given that the time of university administrators is principally regimented by external demands and hence higher degrees of time pressure and given that university students, by contrast, are in relative control of how their daily lives are structured and therefore enjoy temporal flexibility, they predicted with confirmatory evidence that administrators were more likely to respond Monday by adopting the time-moving perspective and students were more likely to respond Friday by adopting the ego-moving perspective (Duffy & Feist, 2014: Experiment 1). Further reasoning that students are also more vulnerable to procrastination than administrators and that procrastination implies psychologically moving tasks forward and further into the future, the movement orientation of which is congruous with that of the ego-moving representation, whereas its opposite, conscientiousness implies psychologically moving tasks forward and closer to the present, the movement orientation of which is congruous with that of the time-moving representation (Duffy & Feist, 2014), they predicted and confirmed that whereas students who preferred the ego-moving perspective averaged significantly higher procrastination scores than those who preferred the time-moving perspective, students who favored the time-moving perspective averaged significantly higher conscientiousness scores than those who favored the alternative (Duffy & Feist, 2014: Experiment 2). Concurrent behavioral data in a real-life setting matched procrastination and conscientiousness self-reports, whereby students who preferred the ego-moving perspective submitted their assignment closer to the deadline than those who favored the time-moving perspective (Duffy, Feist, & McCarthy, 2014: Experiment 2). Taken together, this pattern of results points to the relationship between individual differences in lifestyle and personality and contrary construals of temporal movement being attributed to the psychological perception of distance to the future, with temporal flexibility and procrastination and the ego-moving perspective entailing a longer perceived distance to the future and time pressure and

conscientiousness and the time-moving perspective involving a shorter perceived distance to the future. Indeed, the alternation between the ego-moving perspective and the time-moving perspective has been shown to regulate people's psychological distance with retrospective temporal events, such that recalling an unpleasant past event can be formidable and therefore it prompted the ego-moving perspective that enlarges the temporal distance between the experiencer and the negative incident, whereas reminiscing about a pleasant past event provided a source of happiness that was hard to move away from and thus it encouraged the time-moving perspective that reduced the temporal distance between the experiencer and the positive memory (Lee & Ji, 2014: Study 1).

In another but related avenue of inquiry, much evidence has suggested that temporal distance judgment, that is, perceived duration between now and a specific time in the future, can influence intertemporal decision-making, the trade-off between two temporally spaced outcomes: smaller but sooner rewards versus larger but later rewards (Hayden, 2016; Kim & Zauberman, 2009; 2019a). To illustrate, if one individual who subjectively judges a given future time (e.g., one month) to be longer compared with the other who subjectively judges it to be shorter, the former would be prone to feel greater impatience and discount the future outcome because a longer judgement of temporal distance to the delayed outcome means longer waiting time until the receipt of the delayed benefits (Kim, Zauberman, & Bettman, 2012). At the same time, sundry factors can vary the subjective judgement of prospective temporal duration. For example, future time intervals that ended with losses were judged to be shorter than those with equivalent lengths that ended with gains (Bilgin & Leboeuf, 2010). More recently, an investigation into the effect of music-induced emotions on intertemporal decisions concluded that participants who listened to the happy music perceived a longer temporal distance between today and one day after one year than those who listened to the sad music and consequently, the former preferred the smaller-sooner monetary gain, whereas the latter favored the larger-later option (Zhou, Yang, & Li, 2022: Experiment 1). In a similar vein and more specifically, building on the finding that musical tempi can influence the perception of elapsed time duration (Droit & Wearden, 2002) and that perception of retrospective temporal passage is linked to judgment of prospective temporal distance (Cooper et al., 2013), Kim and Zauberman (2019b) found that music with a fast tempo created a longer judgment of temporal distance to given days in the future and thus made listeners more impatient and discount the value of the delayed reward more heavily than the slow-tempo version. Therefore, it is safe to conclude that the longer the temporal distance to the future is judged to be, the more likely it is for individuals to get impatient and prefer the immediate gain in lieu of the future reward (Romero, Craig, & Kumar, 2019). This, twinned with the fact that the ego-moving perspective (i.e., Friday) implicates a longer perception of distance to the anticipated meeting whilst the time-moving perspective (i.e., Monday) implicates a shorter perception of distance to the anticipated meeting led to the inference that the ego-moving perspective would induce greater impatience and prompt a preference for the more instant gratification compared to the time-moving perspective. Indeed, a recent study found that the ego-moving metaphor lengthened the perceived temporal distance of events and caused greater consumer impatience in a waiting scenario (Xu, Jia, & Rong, 2023). Based on the disparity, the time-moving representation envisions the future as moving toward the ego, and as such, the future appears more proximate and assumes salience, whereas the ego-moving representation envisages the ego as moving toward the future that lies further ahead and, as such the future appears more faraway and seems less salient (Crilly, 2017; Hsee et al., 2014; Nuñez, Motz, & Teuscher, 2006), Crilly (2017) found that the former was primarily used to frame events in the distant future whilst the latter was chiefly used to express the near future. Successive studies further revealed that compared to USA participants who answered Monday in response to the "Next Wednesday's meeting" ambiguity (McGlone & Harding, 1998), those who answered Friday displayed higher discounting of future returns and that priming the time-moving perspective made business professionals more likely to approve long-term strategies (Crilly, 2017). These lines of evidence thus suggest that the ego-moving perspective is associated with short-termism, and the time-moving perspective is associated with long-termism based on differential perceptions of temporal distance.

If perceived temporal distance to the future is embedded in the perspectival dichotomy and differentiates (Crilly, 2017), it is reasonable to assume that factors that can alter temporal distance perception should be able to influence the metaphorical perspectives on time. One such factor is life history strategy (hereinafter LHS). Life history theory is a body of research in evolutionary biology that focuses on how limited energetic resources are allocated throughout a lifetime between life history traits of growth survival, thereby providing a framework for understanding the developmental and reproductive strategies of individuals, populations, and species (Sýkorová, & Flegr, 2021). The theory assumes that there are trade-offs in resources allocation between the present and the future due to environmental opportunities and constraints, and behavioral patterns of these trade-offs are encapsulated on a slow-to-fast continuum that defines the consistency of life history strategies (Ellis et al., 2009; Wang, Michalak, & Ackerman, 2021). More specifically, a fast LHS is more geared toward harsh and unpredictable environments and is characterized by allocating resources toward current reproduction. Individuals enacting this strategy use short-term mating tactics, engage in risky behaviors, and care less about the future (Chua et al., 2016; Griskevicius et al., 2011; Sýkorová & Flegr, 2021). A slow LHS, by contrast, is more tailored to safe and stable environments and features investment in future survival and reproduction. Individuals exercising this strategy seek long-term mates and longer periods of development and possess greater future-orientation (Chua et al., 2016; Kennison, 2017; Kruger et al., 2019). In accordance with life history theory, Međedović (2019) found that compared to participants from central Serbia who were not directly affected by violent conflict, participants from northern Kosovo who were

directly exposed to intergroup strife tended to have higher short-term mating success, desire to marry, have their first child earlier and have more offspring, all indicators of a fast LHS. Similarly, Chinese adolescents living in rural areas who experienced parental separation were more likely to be risk-prone and implement a fast LHS as the adaptive mechanism (Lu & Chang, 2019). Conversely, reasoning that densely populated environments are highly competitive and, therefore, to gain enough competitiveness for survival and reproduction, individuals have to develop their own competence and have fewer offspring so that each offspring receives more resources, Sng and collaborators (2017) predicted with positive results that people living in densely populated regions manifested behaviors characteristic of a slow LHS, such as greater focus on future, commitment to long-term relationship and longer life expectancy. Because a slow LHS deals with environmental risks such as the COVID-19 pandemic by allocating energy toward physical convalescence and behavioral discipline while shifting energy away from reproduction, young people adopting a slow LHS have fewer adjustment difficulties (Chang et al., 2021). Of particular relevance, differences in LHS can influence intertemporal preferences, such that individuals with a fast LHS strategy slanted toward smaller-sooner rewards and those with a slow LHS tilted toward larger-later rewards (Wang et al., 2023a). In a recent study, based on the fact that more tumultuous and adverse environmental conditions elicit the adoption of a fast LHS (Kruger et al., 2019) and that Wuhan city was subject to greater environmental precariousness and austerity during the COVID-19 lockdown period than Chongqing municipality, Li and Cao (2023) found that citizens in Wuhan exhibited a stronger tendency toward a fast LHS and were more likely to choose smaller-sooner rewards than their Chongqing counterparts. In congruence with and furthering this finding, the latest evidence showed that manipulating the salience of COVID-19 risk perception can bias people in favor of a fast LHS by privileging immediate profits over future benefits (Xiao, Xin, & Wang, 2024). In the sense that fast history strategists tend to discount future outcomes in favor of immediate gains, whereas slow life history strategists tend to anticipate future developments and prize delayed benefits (Chisholm, 1999; Del Giudice, Gangestad, & Kaplan, 2015; Kavanagh & Kahl, 2018), the discrimination between life history strategies boils down to time preference for short-term consumption versus long-term investment (Chisholm, 1999; Copping, Campbell, & Muncer, 2014).

Drawing on this insight, along with the finding that differences in perceived temporal distance can lead to contrary intertemporal preferences (Zhou et al., 2022) and that temporal perspectives implicate temporal distance (Lee & Ji, 2014), the current research aimed to investigate the potential relationship between life history strategies and people's metaphorical perspectives on the movement of events in time. In view the fact that the ego-moving perspective involves a longer perception of distance to the future and therefore conduces to impatience and the prioritization of short-term returns, as opposed to the time-moving perspective, which entails a shorter perception of distance to the future that results in the prioritization of long-terms returns (Crilly, 2017; Xu et al., 2023) and the fact that a fast LHS is synonymous with short-termism whilst a slow fast history strategy is identified with long-termism (Griskevicius et al., 2013), we hypothesized that people with a fast LHS would be partial to the ego-moving perspective, whereas those with a slow LHS would be inclined toward the time-moving perspective by reason of differential perceptions of temporal distance. Three studies were carried out to test this hypothesis. The first study explored the relationship between life history strategies and the preferred perspectives on time using the self-report method. An alternative and more implicit behavioral measure was adopted to ascertain the observed correlation (Study 2). Study 3 was tasked to determine whether the perception of temporal distance was the psychological mechanism underlying the link.

3. Methodology

Study 1 explored whether life history strategies related to the perspectives taken in the interpretation of a temporal ambiguous question. We predicted that people with a fast LHS would prefer the ego-moving perspective and people with a slow LHS would prefer the time-moving perspective.

3.1 Method

3.1.1 Participants

A priori power analysis using G*Power 3.1 (Faul et al., 2009) indicated that a minimum sample size of 34 was required to detect a medium-sized effect of 0.5 at the significance level of .05 with a power of 0.8. 234 respondents participated in the online survey (128 female; M_{age} = 34.32 years, *SD* = 10.13). They came from all walks of life (i.e., teachers, civil servants, delivery personnel, self-employed). All were residents of Chongqing in southwest China. To minimize the bias caused by the researcher's degrees of freedom (Wicherts, 2016), statistical analysis did not commence until the data collection concluded. *Post hoc* power estimation using the same software indicated that the achieved power based on the current sample size was 1.000.

3.1.2 Materials and Procedure

The study was created using *Wenjuanxing* (https://www.wjx.cn/), a Chinese online survey platform widely used for data collection (Ning et al., 2020). The questionnaire link was shared on Chinese mainstream social media platforms such as *Weixin* and *Red* to maximize participation. Only those whose place of residence was Chongqing can assess the survey. The data collection lasted approximately three weeks. Participants were informed of the purpose of the study, which is to learn of their outlook on life and work. It is stated explicitly clear that no real name or any other identifying information is required and that all information entered

is for academic research only. Also emphasized is voluntary participation and freedom to withdraw at any time during the filling of the questionnaire. Informed consent must be checked before proceeding to the questions, and it was obtained from all. Completion of the survey came with a monetary reward of 7 yuan.

Two main tasks constituted the survey, the Mini-K, and the temporal disambiguation paradigm. To wit, Mini-K is a 20-item scale designed to measure multiple dimensions that encapsulate life history strategies, including parameters such as family social contact and support (e.g., "I am often in social contact with my blood relatives.") and insight, planning, and control (e.g., "I often find the bright side to a bad situation."), with higher total score indexing and a slower LHS (Figueredo et al., 2006; Richardson et al., 2017; Wang et al., 2023a). The Chinese version of the scale has shown good construct validity in previous studies (Li & Cao, 2023; Wang et al., 2017) and adequate internal consistency in the current work (α = 0.849). Following a precedent (Li & Cao, 2023), each item was rated on an ascending scale of "1 = *totally disagree*" to "5 = *totally agree,*" and all items were averaged to create a composite score tantamount to the individual participant's LHS, with higher average scores corresponding to the slower end of the fast-slow continuum. The Chinese temporal disambiguation paradigm, adapted from the "Next Wednesday's meeting" statement (McGlone & Harding, 1998), asked, "Next Wednesday's meeting has been *moved* two days. What day is the meeting now that it has been moved?" (Zheng et al., 2019). Stripping the adverb from the original (i.e., *moved forward*) is critical for achieving comparable ambiguity among Chinese speakers, for whom the linguistical predisposition to equating "*前* (forward)" with "earlier or past" in time (Li & Cao, 2020) led to a unanimous verdict of Monday in an earlier study where the adverb was retained (Lai & Boroditsky, 2013: Study 1). The adverb-pared adaptation has been tested with proven ambiguity (Li, 2020) and used in recently published studies (e.g., Li & Cao, 2020). A drop-down list with multiple choices from "Next Monday" to "Next Sunday" is appended to the question to preclude an *either-or* response. The order in which the Mini-K and the temporal disambiguation paradigm appeared was randomized. To further distract the respondents from "connecting the dots," two filler questions were interspersed between the two tasks, which were "Do you find Chongqing livable?" and "How long do you think a regular meeting should be?".

3.2 Results

The questionnaire was engineered in such a way that all questions must be filled out before it can be submitted. All participants made successful submissions, and therefore, no data were excluded from statistical analysis using SPSS 25.0.

More respondents (132 out of 234 or 56.41%) interpreted the temporal question from the ego-moving perspective by considering the meeting to be put off to next Friday than the rest who adopted the contrary perspective and understood the meeting to be brought forward to next Monday. In concordance with our prediction, individuals who preferred the time-moving perspective scored higher on the LHS scale (M = 3.078, SD = 0.329) than those who favored the ego-moving perspective (M = 2.929, SD = 0.367). Evidenced by an independent samples t-test, this difference was statistically significant, $t(232) = 4.385$, $p < .001$, $d = 0.557$, 95% CI = [0.307, 0.807]. Taken together, results from Study 1 provided preliminary evidence for the relationship between LHS and people's metaphorical perspectives on time, such that people with a slow LHS were more inclined toward the time-moving perspective, whereas people with a fast LHS were more prone to the ego-moving perspective.

4. Study 2

To further test the robustness of the observed correlation and modelled on previous studies (Jonason, Koenig, & Tost, 2010; Li & Cao, 2023), a proxy indicator of LHS in the form of future-discounting paradigm (i.e., a tradeoff between smaller-sooner rewards and larger-later rewards) was utilized. Although previous research found that the ego-moving frame was associated with higher discounting of future returns and prioritization of the present than the time-moving frame, such finding was based on English-speaking business managers resident in the USA (Crilly, 2017). Whether this finding would generalize to Chinese speakers with non-business backgrounds constituted the secondary aim of Study 2.

4.1 Method

4.1.1 Participants

One hundred and fifty-two university students (87 female; M_{age} = 22.11 years, SD = 2.07) signed up for the study. They came from the Chinese mainland and were studying for business-unrelated degrees such as Literature, Journalism, or Marxism. None had taken part in the preceding study. They were compensated for their time with a coupon worth 5 or 7 yuan of their own choosing. To minimize the bias caused by researcher degrees of freedom (Wicherts et al., 2016), statistical analysis did not commence until the data collection concluded. *Post hoc* power estimation using G*Power 3.1 (Faul et al., 2009) indicated that the achieved power based on the current sample size approximated 1.000.

4.1.2 Materials and procedure

Participants were informed of the purpose of the study, which was veiled as a survey about time management behaviors among university students. The anonymity, confidentiality, and voluntariness of the study were also stressed. Inform consent was obtained from all. The study was conducted in quiet classrooms using pen and paper. Two tasks comprised the questionnaire, the temporal disambiguation paradigm, and the intertemporal decision-making. As before, "Next Wednesday's meeting" ambiguity (e.g., Li, 2020) was used to examine temporal perspective preferences. To preempt an *either-or* eventuality, the emphasis that a single and instinctive answer was required was appended. As regards the intertemporal choices, participants were asked to make a choice between an immediate reward and a delayed reward. More specifically, based on a recent research design (Romero et al., 2019), we partnered with two convenience stores on campus that students routinely frequent and negotiated two coupon options: "5 yuan off your purchase today" *versus* "7 yuan off your purchase in four days". Coupons were valid for three days from the day of the issuance. Preference for the immediate offer signals higher future-discounting, which indicates a fast LHS. Conversely, leaning toward the delayed offer signifies lower future-discounting, which indicates a slow LHS. Participants were reminded to weigh their options very carefully, as their decision would end up being rewarded in exchange for their participation. The order in which the temporal question and the intertemporal decision-making appeared was randomized. To bolster the cover story, two filler questions were asked, "What would ideally be the business hours of the convenience stores on campus?" and "What would ideally be the latest hours for the library to stay open?".

4.2 Results

Participants were probed for suspicion, and none cast doubt on the cover story. All completed the tasks, and therefore, all data were valid and entered in SPSS 25.0 for statistical analysis.

Overall, slightly more participants were inclined toward the ego-moving perspective (78 out of 152 or 51.32%) than the opposite time-moving perspective. As regards intertemporal choices, more participants opted for the immediate reward (83 out of 152 or 54.61%) than the delayed reward. Notably, the majority of participants who preferred the 5-yuan discount (indicative of a fast LHS) adopted the ego-moving perspective (52 out of 83 or 62.65%), which differed distinguishably from the rest who adopted the time-moving perspective (Z = -2.195, p = .028 by a sign test). By contrast, a larger proportion of participants who displayed the patience to wait for the 7-yuan offer (indicative of a slow LHS) took the time-moving perspective (43 out of 69 or 62.32%), which was marginally different from those who took the ego-moving perspective (Z = -1.926, p = .054). A chi-square test of independence revealed that this disparity was statistically significant, $\chi^2_{1,\,152}$ = 9.403, p = .002, Cramer's V = 0.249 (see **Fig. 1**). To find out whether the intertemporal preferences were related to the preferred perspectives, a binary logistic regression was performed with the former as the independent variable and the latter (time-moving perspective = 0; ego-moving perspective = 1) as the dependent variable. The results showed that intertemporal preferences were a reliable and significant predictor of people's perspectives on time, Nagelkerke R^2 = 0.081, Waldχ^2 (1, N = 152) = 9.197, p = .002, odds ratio = 0.360, 95% CI = [0.186, 0.697], thereby substantiating the relationship between life history strategies and temporal perspective preferences observed in Study 1.

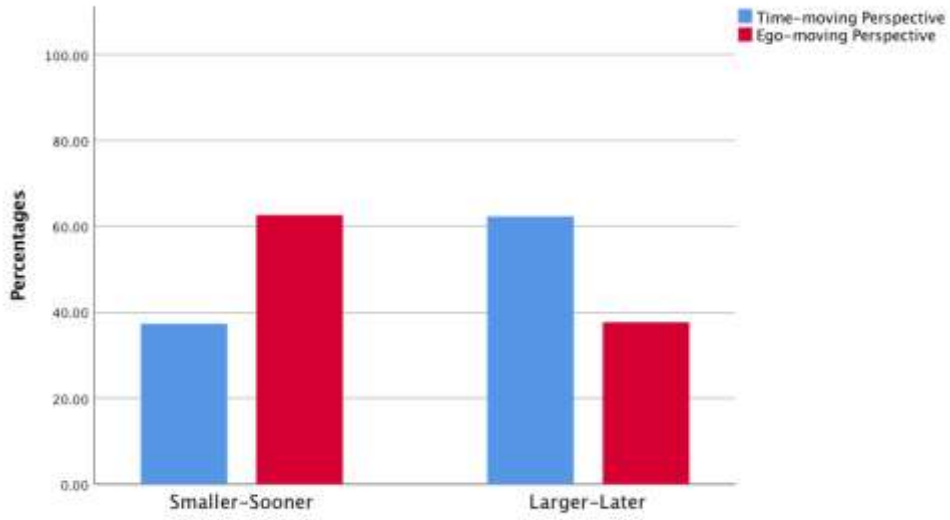

Fig. 1 Percentages of the time-moving perspective and the ego-moving perspective between participants who preferred the smaller-sooner reward and participants who preferred the larger-later reward

5. Study 3

Despite Study 1 and Study 2 providing consistent evidence for the connection between LHS and the preferred perspective on time, the underlying mechanism remained unclear. Given that intertemporal preferences were attributed to differences in perceived temporal distance (Kim & Zauberman, 2019b; Zhou et al., 2022) and that the ego-moving perspective creates a psychologically lengthier distance to the future compared to the time-moving perspective (Xu et al., 2023) led to the inference that temporal distance may underlie the relationship between life history strategies and temporal perspective preferences. To test this hypothesis, we examined the priming effect of temporal perspectives on intertemporal decision-making.

5.1 Method

5.1.1 Participants

A priori power analysis indicated that a sample size of 128 was required to detect a medium-sized effect of 0.5 at the significance level of .05 with a power of 0.8. 174 university students enrolled in the study (105 female; M_{age} = 21.60 years, *SD* = 1.33). They came from the Chinese mainland and were studying for business-unrelated degrees such as Environment and Resources and Art. None had partaken in the foregoing studies, and all gave informed consent. In exchange for their participation, each received a monetary reward of 5 yuan.

5.1.2 Materials and procedure

The purpose of the study was marked as a survey of waiting experiences on campus. The setting was the same as that of Study 2, but the questions and procedure differed. To wit, participants were evenly and randomly assigned to the time-moving or the ego-moving condition. Based on previous studies (Hauser et al., 2009; Richmond et al., 2012), perspective priming was achieved through rescheduling tasks. Specifically, participants were presented with sentences formulated based on the pattern "Next [initial day]'s [event] has been moved [number of days] days. The [event] is now on [ending day]". This was followed by seven days of the week equidistantly displayed on a horizontal line, and the task was to circle the ending day on the line. Six emotionally neutral events were selected, which were a trip, presentation, dinner, appointment, interview, and meeting and the order of their appearances was randomized. For the time-moving condition, the events were moved toward the participants (e.g., "Next *Thursday*'s dinner has been moved two days. The dinner is now on *Tuesday*"). For the ego-moving condition, the events were moved away from the participants (e.g., "Next *Monday*'s trip has been moved one day. The trip is now on *Tuesday*.") (Hauser et al., 2009). With reference to the subsequent intertemporal choice, a monetary dilemma adapted from a previous study (Romero et al., 2019: Study 4) was employed. Concretely, participants were asked to choose between getting "3 yuan now" or "5 yuan in four days". As before, they were urged to weigh their options prudently as their decision would end up as the reward for their participation. Again, the choice of immediate payoff is indicative of a fast LHS and the choice of delayed payment is suggestive of a slow life strategy. This was succeeded by the temporal distance perception, which asked participants to report how long the additional three-day wait felt to them on an ascending scale of 1 to 9, with a higher number indicating greater length. Each participant was awarded 5 yuan regardless of their choice. To buttress the cover story, two filler questions asking "How long do you think it should be between a takeaway order being placed online and it being delivered in person?" and "How do you find the waiting intervals between campus shuttle arrivals?" were appended.

5.2 Results

Participants were probed for suspicion, and none cast suspicion on the cover story. Preliminary checks found 11 questionnaires that left priming tasks partially fulfilled. Consequently, their data were excluded, leaving 163 samples (97 female; M_{age} = 21.58 years, *SD* =1.36) valid for statistical analysis in SPSS 25.0.

In concordance with the previous finding, temporal perspectives had a main effect on intertemporal preferences, as revealed by a chi-square test of independence, $\chi^2_{1,\ 163}$ = 12.522, p < .001, Cramer's V = 0.277. Upon closer inspection, nearly two thirds of the participants (53 out of 80 or 66.25%) primed with the ego-moving perspective preferred the smaller-sooner payoff (consistent with a fast LHS), which was statistically distinguishable from the rest who preferred the later-larger payment (consistent with a slow LHS) (Z = -2.795, p = .005). The reverse pattern was found in the time-moving condition, where the majority of participants (51 out of 83 or 61.45%) leaned toward the delayed payment, which was markedly different from the rest who favored the alternative immediate payoff (Z = -1.976, p = .048) (see **Fig. 2**). In addition, conditions differed remarkably in temporal distance perception, $t(161)$ = -5.254, p < .001, d = -0.764, 95%CI = [-1.050, -0.476], manifest in the fact that participants primed with the ego-moving perspective (M = 4.538, SD = 1.292) felt the extra three-day wait to be significantly longer than those primed with the alternative (M = 3.337, SD = 0.979). To determine whether temporal distance underlay the relationship between temporal perspectives and intertemporal choices, we performed a series of regression analyses. First, temporal perspectives reliably predicted intertemporal choices, β = -0.277, p < .001, and temporal distance, β = 1.200, p < .001. Furthermore, temporal distance was a positive predictor of intertemporal choices, β = -0.246, p < .001. Regressing intertemporal choices jointly on temporal perspectives and temporal distance revealed that whilst temporal distance remained as a significant predictor, β = -0.251, p < .001, temporal perspectives no

longer were, β = 0.024, p = .732. In keeping with our hypothesis, these results suggested that temporal distance fully mediated the effect of temporal perspectives on the monetary trade-off (see **Fig. 3**). Using SPSS PROCESS macro v.4 (Model 4) with 5000 bootstrap samples (Hayes & Preacher, 2014) confirmed the significant indirect pathway, 95%CI = [-3.620, -1.381]. Taken together, these results suggested that the relationship between the preferred perspective on time and LHS by way of intertemporal choices was underlain by perceived temporal distance, such that the adoption of the ego-moving perspective generated a longer perception of distance to the future, which in turn prompted a preference for the smaller-sooner payoff, whereas the assumption of the time-moving perspective produced a shorter perception of distance to the future which in turn encouraged a liking for the larger-later payment.

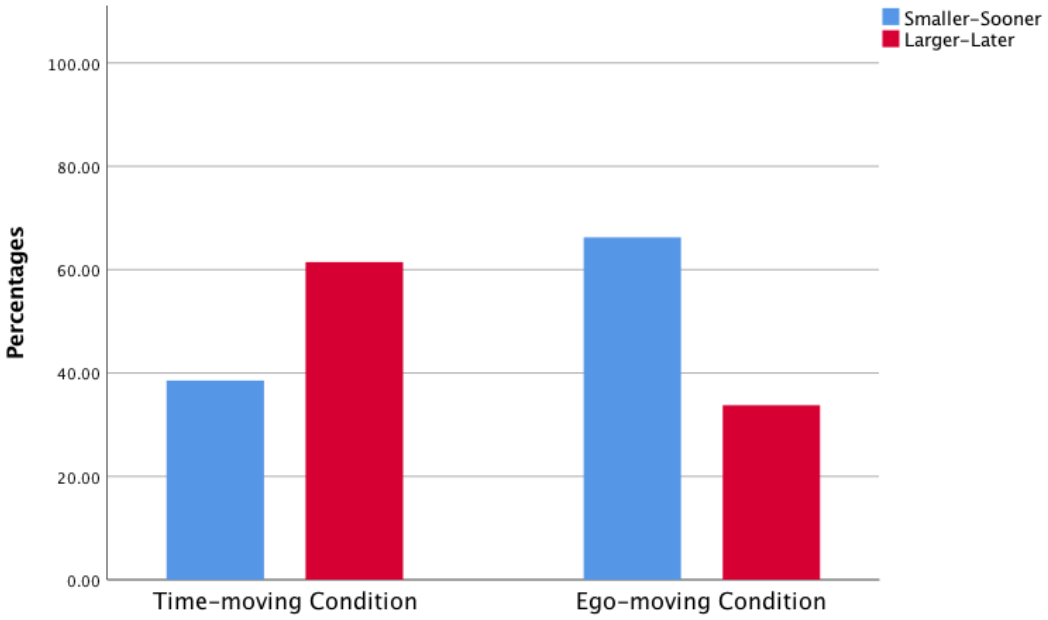

Fig. 2 Percentages of the smaller-sooner choice and the larger-later choice between participants primed with the time-moving perspective and participants primed with the ego-moving perspective

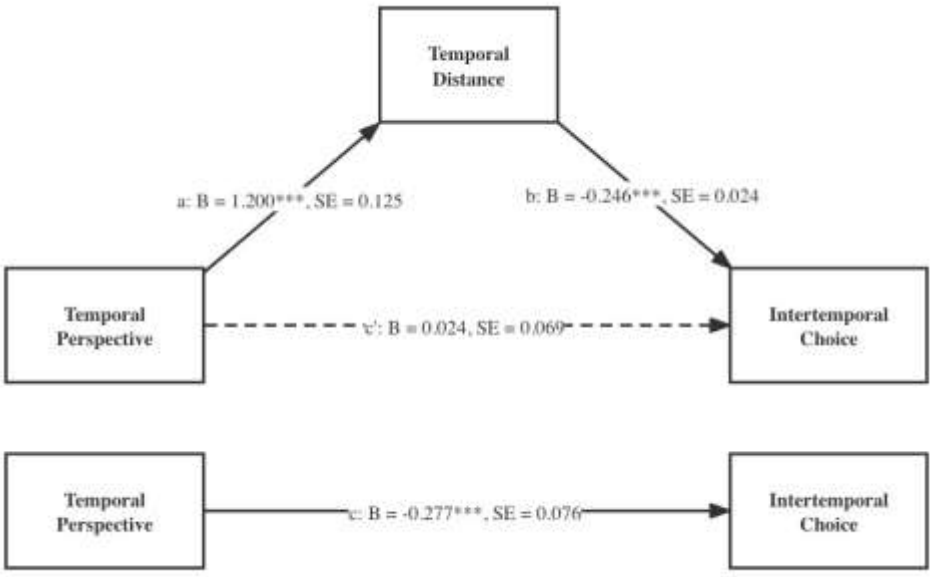

Fig. 3 The mediation model illustrating the indirect effect of temporal perspectives on intertemporal choices through perceived temporal distance. Values on the paths represent unstandardized B and standard error (SE). ***p < .001.

6. General Discussion

6.1 Overview

People's metaphorical perspectives on the movement of events in time are subject to change due to myriad factors such as time-structuring and time horizon resulting from individual differences in lifestyle and personality (Duffy & Feist, 2014). Building on and extending this line of inquiry, the current research investigated how LHS, a similarly time-related psychological construct concerned with short-term *versus* long-term trade-offs based on different outlooks on the future (Kavanagh & Kahl, 2018) related to the preferred perspective in the interpretation of ambiguous language related to time. Field and laboratory data provided convergent findings that individuals with a fast LHS tended to adopt the ego-moving perspective, whereas individuals with a slow LHS tended to adopt the time-moving perspective as a result of differential perceptions of temporal distance to the future.

6.2 Individual differences in LHS

A recent study found that residents in Wuhan who underwent more precarious and trying environmental upheaval during the COVID-19 lockdown period manifested a faster LHS compared to those in Chongqing on whom the environmental harshness had a diminished impact (Li & Cao, 2023). Advancing these findings, we sketched a more nuanced picture by documenting that even within a single city boundary (i.e., Chongqing) where outside environmental conditions were largely the same, people's life history strategies can still differ. Possible reasons are that, for one thing, life history strategies may evolve and can be adapted in response to changes in the external environment (Kavanagh & Kahl, 2018); for another, life history strategies are also linked to other factors such as personality and intelligence (Dunkel, van der Linden, & Holler, 2021) and individual family circumstances. For example, when primed with recession cues, people with lower childhood socioeconomic status preferred immediate and riskier rewards (consistent with a fast LHS), which was in contrast to those growing up in relatively advantaged socioeconomic environments, who valued delayed and safer rewards (consistent with a slow LHS) (Griskevicius et al., 2013).

6.3 LHS and the preferred perspective on time

Life history strategies vary in accordance with the weighting of the future, with people with a fast LHS tending to discount future outcomes and privilege immediate gratification and those with a slow LHS tending to focus on long-term development and prize delayed gratification. This contrast in the trade-off between current consumption and investment in the future is fundamentally a difference in time preference, with fast life history strategists being more present-oriented and slow life history strategists being more future-oriented (Chisholm, 1999). This distinction in time orientation coheres with that which distinguishes temporal perspectives in that the ego-moving perspective is more often used to frame events in the near future, whereas the time-moving perspective is more frequently used to frame events in the distant future (Crilly, 2017). To the extent that valuations of future prospects would shape trade-off decisions regarding the prioritization of present *versus* future (Crilly, 2017; Griskevicius et al., 2011), the longer (vs. shorter) the distance to the future people subjectively feel, the more (vs. less) uncertainties to the future people are likely to attach and with less (vs. more) willingness and confidence people would end up investing in the future. In other words, a mutual reference to the (lack of) anticipation of the future underpins the connection between LHS and the preferred perspective on time. In alignment with this theorizing, we showed that individuals with a fast LHS preferred the ego-moving perspective, whereas those with a slow LHS favored the time-moving perspective as a result of differential perceptions of temporal distance. More specifically, corroborating and forwarding the findings that whereas the ego-moving metaphor lengthened perceived distance to the future and resulted in greater consumer impatience in a waiting situation (Xu et al., 2023), the time-moving metaphor made the future appear more proximate and encouraged a long-term vision among corporate executives (Crilly, 2017), we provided empirical evidence demonstrating that the relationship between temporal perspectives and intertemporal decision-making was underlain by differential perceptions of distance to the future. As such, we generalized the association between temporal perspectives and intertemporal decision-making to a Chinese sample with non-business backgrounds and revealed the underlying mechanism thereof, thereby accentuating the centrality of time preference underpinning trade-offs between the present and the future, which is consistent with the life history theory (Chisholm, 1999; Copping et al., 2014).

6.4 Intertemporal choice and the preferred perspective on time

Recent research has suggested that intertemporal decision-making relates to such time-related constructs as the view of time and temporal focus, such that individuals with a linear (vs. circular) view of time and individuals with a future focus (vs. past focus) exhibited a greater tendency to discount future and prefer smaller-sooner rewards (Wang et al., 2023a; Wang et al., 2023b). Concretely, individuals with a linear view of time think of temporal passage as an irreversible futureward progression, whilst temporal passage for those with a circular view of time is understood to be cyclical and recursive, and consequently, people with the former time view tend to focus more on the future and people with the latter view tend to focus more on the past (Tam & Dholakia, 2013; Xu et al., 2019). Accordingly, recent research found that individuals with a circular (vs. linear) view of time were more receptive to pro-environmental intentions and behavior (Xu, Zhao, et al., 2023) and that people who preferred a future focus displayed higher delay discount rate and preferred smaller-sooner rewards than people with a past focus who discounted the delay time less and preferred larger-later rewards (Wang et al., 2023a). Correspondent with these findings, we evidenced that individuals who preferred the ego-moving representation, which implies a futureward movement of time, and those who preferred

the time-moving representation, which implies a pastward movement of time (McGlone & Harding, 1998) leaned toward smaller-sooner payoffs and larger-later payments, respectively.

6.5 Temporal distance and the preferred perspective on time

It was previously suggested that the influence of spatial and spatially-grounded factors (e.g., emotion) on the metaphorical representation of time is underpinned by approach-avoidance motivation (Zheng et al., 2019). To wit, the ego-moving perspective is spatially represented by approach motivation and the time-moving perspective is spatially represented by avoidance motivation (Richmond et al., 2012). and therefore, factors that are characterized by approach-related motivation are associated with the ego-moving perspective, and those that are characterized by avoidance-related motivation are associated with the time-moving perspective through a shared embodied link (Zheng et al., 2019). For example, because anger features approach-related motivation (Harmon-Jones, 2007), people with higher trait anger and state anger exhibited a propensity for the ego-moving perspective (Hauser et al., 2009). Contrastively, Taoists, consequent to their *wu-wei* (*no action*) doctrine, possess a lower level of personal agency that is grounded in avoidance motivation and, as a result, slanted toward the time-moving perspective compared to atheists (Li & Cao, 2020). This being the case, it is worth noting that whilst the correspondence between the ego-moving representation and approach motivation is consistent, that between the time-moving representation and avoidance motivation is less so. For instance, based on the connection between higher power and approach motivation and lower power and avoidance motivation (Keltner, Gruenfeld, & Anderson, 2003), Duffy and Feist (2017) showed that whereas brief adoption of high-power poses produced a greater preference for the ego-moving perspective, lower-power posers did not lean toward the time-moving perspective. One likely explanation for the asymmetrical effect is that avoidance motivation may lead to a lack of motion as well as backward motion (Elliot, Eder, & Harmon-Jones, 2013), which renders the effect of avoidance motivation on motion-grounded temporal representation less determinate (Duffy & Feist, 2017). Alternatively, by revealing the intermediary role of temporal distance perception in the relationship between intertemporal preferences and temporal perspective preferences, we offered a more consistent and sure psychological mechanism explaining the connection between non-spatial factors and the preferred perspectives on time. As such, our findings open up promising avenues of research in the sense that, theoretically, factors that can vary temporal distance perceptions may potentially modulate metaphorical representations of time. For example, participants listening to music with a fast tempo judged a future day to be longer than those who listened to music with a slow tempo (Zhou et al., 2022). It would be interesting to know whether musical tempi would influence people's metaphorical perspectives on time.

6.6 Limitations

The current research suffers from the following limitations that may inform future research. First, although our correlational results were based on a cross-section of society, it did not use probability sampling, hence its external generalizability. Further evidence from other cities in China is required to test the strength of the current observations. Second, recent work suggested that the manners in which the temporally ambiguous question was resolved can vary as a function of the days of the week on which the study was conducted, such that English-speaking participants were more likely to answer Friday when asked the question on Friday compared to Monday (Medimorec, 2022). In light of the duration of the online survey, during which time an individual filled out the online questionnaire at their leisure, we cannot dismiss the possibility that those with a fast LHS might have happened to access the survey on a Friday. Efforts may be taken in the future to disentangle the more extrinsic influence of the days of the week from the more intrinsic factor of LHS on the preferred perspectives on time. Moreover, LHS relates to personality, such that a slower LHS is associated with conscientiousness, whilst a faster LHS is associated with extroversion (Manson, 2017). It was also found that individuals with a preference for the time-moving perspective scored higher in conscientiousness, whereas individuals with an inclination toward the ego-moving perspective scored higher in extroversion (Duffy & Feist, 2014). The absence of measurement of these personality dimensions adds potential confounders to the observed correlation between life history strategies and temporal perspective preferences, that is, whether it was individual differences in life history traits or those in levels of conscientiousness and extroversion that accounted for the temporal perspective preferences. Future undertakings would do well to examine the relationship between LHS and temporal reasoning while controlling for the said personality traits. Finally, bearing in mind that a single-item experimental question (i.e., the "meeting" ambiguity) can be potentially unreliable (Li & Cao, 2020), future research should consider incorporating more items (e.g., clock- and calendar-based ambiguities) to test the robustness of the dispensation of the ego-moving and the time-moving perspectives on time (Richmond et al., 2012).

7. Conclusion

The current investigation demonstrated the relationship between LHS and people's metaphorical perspectives on the movement of events in time. Individuals with a fast LHS preferred the ego-moving perspective, whereas individuals with a slow LHS preferred the time-moving perspective through differential perceptions of temporal distance. By identifying the role of a new factor in influencing temporal perspective preferences, the present work sheds further light on the complexity of variables at play in influencing the metaphorical representation of time.

Funding: This research received no external funding
Conflicts of Interest: The authors declare no conflict of interest.
ORCID iD: 0000-0003-3717-7101
Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

References

[1] Bender, A., & Beller, S. (2014). Mapping spatial frames of reference onto time: A review of theoretical accounts and empirical findings. *Cognition*, 132, 342–382. https://doi.org/10.1016/j.cognition.2014.03.016

[2] Bilgin, B., & Leboeuf, R. A. (2010). Looming Losses in Future Time Perception. *Journal of Marketing Research*, *47*(3), 520-530. https://doi.org/10.1509/jmkr.47.3.520

[3] Boroditsky, L. (2000). Metaphoric structuring: Understanding time through spatial metaphors. *Cognition*, *75*(1), 1–28. https://doi.org/10.1016/S0010-0277(99)00073-6

[4] Boroditsky, L., & Ramscar, M. (2002). The roles of body and mind in abstract thought. *Psychological Science, 13*(2), 185–189. https://doi.org/10.1111/1467-9280.00434

[5] Chang, L., Liu, Y. Y., Lu, H. J., Lansford, J. E., Bornstein, M. H., Steinberg, L., Deater-Deckard, K., Rothenberg, W. A., Skinner, A. T., & Dodge, K. A. (2021). Slow Life History Strategies and Increases in Externalizing and Internalizing Problems During the COVID-19 Pandemic. *Journal of Research on Adolescence: The Official Journal of the Society for Research on Adolescence*, *31*(3), 595–607. https://doi.org/10.1111/jora.12661

[6] Chisholm J. (1999). *Death, hope, and sex: Steps to an evolutionary ecology of mind and morality.* Cambridge: Cambridge University Press.

[7] Chua, K. J., Lukaszewski, A. W., Grant, D. M., & Sng, O. (2016). Human life history strategies: Calibrated to external or internal cues? *Evolutionary Psychology*, *15*(1), 1474704916677342. https://doi.org/10.1177/1474704916677342

[8] Clark, H. H. (1973). Space, time, semantics, and the child. In T. E. Moore (Ed.), Cognitive development and the acquisition of language (pp. 27–63). New York, NY: Academic Press.

[9] Cooper, N., Kable, J. W., Kim, B. K., & Zauberman, G. (2013). Brain activity in valuation regions while thinking about the future predicts individual discount rates. *The Journal of Neuroscience: the Official Journal of the Society for Neuroscience*, *33*(32), 13150–13156. https://doi.org/10.1523/JNEUROSCI.0400-13.2013

[10] Copping, L. T., Campbell, A., & Muncer, S. (2014). Conceptualizing Time Preference: A Life-History Analysis. *Evolutionary Psychology*, *12*(4), 829-847. https://doi.org/10.1177/147470491401200411

[11] Crilly, D. (2017), Time and Space in Strategy Discourse: Implications for Intertemporal Choice. *Strategic Management Journal*, *38*(12), 2370–2389. https://doi.org/10.1002/smj.2687

[12] Del-Giudice, M., Gangestad, S. W., Kaplan H. S. (2015). Life history theory and evolutionary psychology. In D. M. Buss (Ed.), *The Handbook of Evolutionary Psychology: Vol. Foundations* (2nd ed., 88–114). John Wiley & Sons, Inc. https://doi.org/10.1002/9781119125563.evpsych102

[13] Droit-Volet, S., & Wearden, J. (2002). Speeding up an internal clock in children? Effects of visual flicker on subjective duration. *The Quarterly Journal of Experimental Psychology. B, Comparative and Physiological Psychology*, *55*(3), 193–211. https://doi.org/10.1080/02724990143000252

[14] Duffy, S. & Feist, M. I. (2014). Individual differences in the interpretation of ambiguous statements about time. *Cognitive Linguistics*, *25*(1), 29–54. https://doi.org/10.1515/cog-2013-0030

[15] Duffy, S. E., & Feist, M. I. (2017). Power in time: The influence of power posing on metaphoric perspectives on time. *Language and Cognition*, *9*(4), 637. https://doi.org/10.1017/langcog.2016.33

[16] Duffy, S. E., Feist, M. I., & McCarthy, S. (2014). Moving through time: The role of personality in three real-life contexts. *Cognitive Science, 38*(8), 1662–1674. https://doi.org/10.1111/cogs.12124

[17] Dunkel, C. S., van der Linden, D., & Holler, R. H. (2021). Life history strategy and intelligence: Commonality and personality profile differences. *Personality and Individual Differences*, *175*, 110667. https://doi.org/10.1016/j.paid.2021.110667

[18] Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature, 20*(2), 204–268. https://doi.org/10.1007/s12110-009-9063-7

[19] Elliot, A. J., Eder, A. B., & Harmon-Jones, E. (2013). Approach–avoidance motivation and emotion: Convergence and divergence. *Emotion Review, 5*(3), 308–311. https://doi.org/10.1177/1754073913477517

[20] Evans, V. (2004). The structure of time: Language, meaning, and temporal cognition. Amsterdam, Netherlands: John Benjamins.

[21] Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

[22] Feist, M. I., & Duffy, S. E. (2023a). To each their own: a review of individual differences and metaphorical perspectives on time. *Frontiers in Psychology*, *14*, 1213719. https://doi.org/10.3389/fpsyg.2023.1213719

[23] Feist, M. I. & Duffy, S. E. (2023b), Cognitive Science: Piecing Together the Puzzle. *Cognitive Science*, *47*, e13319. https://doi.org/10.1111/cogs.13319

[24] Figueredo, A. J., Vásquez, G., Brumbach, B. H., Schneider, S. M. R., Sefcek, J. A., Tal, I. R., Hill, D., Wenner, C. J., & Jacobs, W. J. (2006). Consilience and Life History Theory: From genes to brain to reproductive strategy. *Developmental Review, 26*(2), 243–275. https://doi.org/10.1016/j.dr.2006.02.002

[25] Fuhrman, O., McCormick, K., Chen, E., Jiang, H., Shu, D., Mao, S., & Boroditsky, L. (2011). How linguistic and cultural forces shape conceptions of time: English and mandarin time in 3D. *Cognitive Science*, *35*,1305–1328. https://doi.org/10.1111/j.1551-6709.2011.01193.x

[26] Griskevicius, V., Ackerman, J. M., Cantú, S. M., Delton, A. W., Robertson, T. E., Simpson, J. A., Thompson, M. E., & Tybur, J. M. (2013). When the Economy Falters, Do People Spend or Save? Responses to Resource Scarcity Depend on Childhood Environments. *Psychological Science*, *24*(2), 197-205. https://doi.org/10.1177/0956797612451471

[27] Griskevicius, V., Delton, A. W., Robertson, T. E., & Tybur, J. M. (2011). Environmental contingency in life history strategies: the influence of mortality and socioeconomic status on reproductive timing. *Journal of Personality and Social Psychology*, *100*(2), 241–254. https://doi.org/10.1037/a0021082

[28] Gu, Y., Zheng, Y., & Swerts, M. (2019). Which is in front of Chinese people, past or future? The effect of language and culture on temporal gestures and spatial conceptions of time. *Cognitive Science*, *43*(12), e12804. https://doi.org/10.1111/cogs.12804

[29] Harmon-Jones, E. (2007). Asymmetrical frontal cortical activity, affective valence, and motivational direction. In E. Harmon-Jones & P. Winkielman (Eds.), Social neuroscience: Integrating biological and psychological explanations of social behavior (pp. 137-156). New York: Guilford Press.

[30] Hauser, D., Carter, M., & Meier, B. (2009). Mellow Monday and furious Friday: The approach-related link between anger and time representation. *Cognition and Emotion*, *23*(6), 1166–1180. http://dx.doi.org/10.1080/02699930802358424

[31] Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology*, *67*(3), 451–470. https://doi.org/10.1111/bmsp.12028

[32] Hayden, B. Y. (2016). Time discounting and time preference in animals: A critical review. *Psychological Bulletin Review, 23*, 39–53. https://doi.org/10.3758/s13423-015-0879-3

[33] Hsee, C. K., Tu, Y., Lu, Z. Y., & Ruan, B. (2014). Approach aversion: negative hedonic reactions toward approaching stimuli. *Journal of Personality and Social Psychology*, *106*(5), 699–712. https://doi.org/10.1037/a0036332

[34] Huang, Y., & Tse, C. S. (2017). Linguistic Relativity in Conceptual Metaphors. In Ardila, A., Cieślicka, A., Heredia, R., Rosselli, M. (Eds.), *Psychology of bilingualism: The cognitive and emotional world of bilinguals*. Springer, Cham. https://doi.org/10.1007/978-3-319-64099-0_1

[35] Jonason, P. K., Koenig, B. L., & Tost, J. (2010). Living a fast life: The Dark Triad and life history theory. *Human Nature, 21*(4), 428–442. https://doi.org/10.1007/s12110-010-9102-4

[36] Kavanagh, P. S., & Kahl, B. L. (2018). Are Expectations the Missing Link between Life History Strategies and Psychopathology? *Frontiers in Psychology*, *9*, 89. https://doi.org/10.3389/fpsyg.2018.00089

[37] Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review, 110*(2), 265–284. https://doi.org/10.1037/0033-295X.110.2.265

[38] Kennison, S. M., Byrd-Craven, J., & Hamilton, S. L. (2017). Individual differences in talking enjoyment: The roles of life history strategy and mate value. *Cogent Psychology, 4*(1), 1395310. https://doi.org/10.1080/23311908.2017.1395310

[39] Kim, B. K., & Zauberman, G. (2009). Perception of anticipatory time in temporal discounting. *Journal of Neuroscience, Psychology, and Economics, 2*(2), 91–101. https://doi.org/10.1037/a0017686

[40] Kim, B. K., & Zauberman, G. (2019a). Psychological time and intertemporal preference. *Current Opinion in Psychology*, *26*, 90–93. https://doi.org/10.1016/j.copsyc.2018.06.005

[41] Kim, B. K., & Zauberman, G. (2019b). The effect of music tempo on consumer impatience in intertemporal decisions. *European Journal of Marketing, 53*(3), 504–523. https://doi.org/10.1108/EJM-10-2017-0696

[42] Kim, B. K., Zauberman, G., & Bettman, J. R. (2012). Space, time, and intertemporal preferences. *Journal of Consumer Research*, *39*(4), 867–880. https://doi.org/10.1086/666464

[43] Kruger, D. J., Fernandes, H. B. F., Cupal, S., & Homish, G. G. (2019). Life history variation and the preparedness paradox. *Evolutionary Behavioral Sciences, 13*(3), 242–253. https://doi.org/10.1037/ebs0000129

[44] Lai, V. T., & Boroditsky, L. (2013). The immediate and chronic influence of spatio-temporal metaphors on the mental representations of time in English, Mandarin, and Mandarin-English speakers. *Frontiers in Psychology*, *4*, 142. https://doi.org/10.3389/fpsyg.2013.00142

[45] Lakoff, G., & Jonhson, M. (1980). Metaphors we live by. Chicago, U.S.: University of Chicago Press.

[46] Lakoff, G., & Johnson, M. (1999). Philosophy in the flesh: The embodied mind and its challenge to western thought. New York: Basic Books.

[47] Lang, P. J. (2010). Emotion and motivation: Toward consensus definitions and a common research purpose. *Emotion Review, 2*(3), 229–233. https://doi.org/10.1177/1754073910361984

[48] Lee, A. & Ji, L. (2014). Moving away from a bad past and toward a good future: Feelings influence the metaphorical understanding of time. *Journal of Experimental Psychology: General*, *143*(1), 21–26. https://psycnet.apa.org/doi/10.1037/a0032233

[49] Li, H. (2020). Will it really happen? Disambiguating of the hypothetical and real "Next Wednesday's meeting" question in Mandarin speakers. *Lingua*, *237*, 102806. https://doi.org/10.1016/j.lingua.2020.102806

[50] Li, H., & Cao, Y. (2020): Move with the Flow: Metaphorical Perspectives on Time in Chinese Taoists and Atheists. *The International Journal for the Psychology of Religion*, *31*(4), 225–234. https://doi.org/10.1080/10508619.2020.1825174

[51] Li, H., & Cao, Y. (2023). Facing the pandemic in the dark: Psychopathic personality traits and life history strategies during COVID-19 lockdown period in different areas of China. *Current Psychology (New Brunswick, N.J.)*, *42*(2), 1299–1307. https://doi.org/10.1007/s12144-021-01549-2

[52] Lu, H. J., & Chang, L. (2019). Aggression and risk-taking as adaptive implementations of fast life history strategy. *Developmental Science*, *22*(5), e12827. https://doi.org/10.1111/desc.12827

[53] Majid, A., Gaby, A., & Boroditsky, L. (2013). Time in terms of space. *Frontiers in Psychology*, *4*, 554. https://doi.org/10.3389/fpsyg.2013.00554

[54] Manson, J. H. (2015). Life History Strategy and the HEXACO Personality Dimensions. *Evolutionary Psychology*, *13*(1), 48–66. https://doi.org/10.1177/147470491501300104

[55] Matlock, T., Holmes, K. J., Srinivasan, M., & Ramscar, M. (2011). Even abstract motion influences the understanding of time. *Metaphor and Symbol*, *26*, 260–271. https://doi.org/10.1080/10926488.2011.609065

[56] Matlock, T., Ramscar, M., & Boroditsky, L. (2005). On the experiential link between spatial and temporal language. *Cognitive Science*, *29*(4), 655–664. https://doi.org/10.1207/s15516709cog0000_17

[57] McGlone, M. S., & Harding, J. L. (1998). Back (or forward?) to the future: The role of perspective in temporal language comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 24*(5), 1211–1223. https://doi.org/10.1037/0278-7393.24.5.1211

[58] Međedović, J. (2019). Life history in a postconflict society: Violent intergroup conflict facilitates fast life-history strategy. *Human Nature, 30*(1), 59–70. https://doi.org/10.1007/s12110-018-09336-y
[59] Medimorec, S. (2022). The Effects of Day of the Week on Temporal Ambiguity Resolution. *Psychological Reports*, *125*(2), 882–889. https://doi.org/10.1177/0033294120979686
[60] Miles, L. K., Nind, L. K., & Macrae, C. N. (2010). Moving Through Time. *Psychological Science*, *21*(2), 222–223. https://doi.org/10.1177/0956797609359333
[61] Ning, L., Niu, J., Bi, X., Yang, C., Liu, Z., Wu, Q., Ning, N., Liang, L., Liu, A., Hao, Y., Gao, L., & Liu, C. (2020). The impacts of knowledge, risk perception, emotion and information on citizens' protective behaviors during the outbreak of COVID-19: a cross-sectional study in China. *BMC Public Health*, *20*(1), 1751. https://doi.org/10.1186/s12889-020-09892-y
[62] Nunez, R. E., Motz, B. A., & Teuscher, U. (2006). Time after time: The psychological reality of the ego- and time-reference-point distinction in metaphorical construals of time. *Metaphor and Symbol*, *21*(3), 133–146. https://doi.org/10.1207/s15327868ms2103_1
[63] Richardson, G. B., Chen, C.-C., Dai, C.-L., Brubaker, M. D., & Nedelec, J. L. (2017). The Psychometrics of the Mini-K: Evidence From Two College Samples. *Evolutionary Psychology*, *15*(1). https://doi.org/10.1177/1474704916682034
[64] Richmond, J., Wilson, J. C., & Zinken, J. (2012). A feeling for the future: How does agency in time metaphors relate to feelings? *European Journal of Social Psychology*, *42*(7), 813–823. https://doi.org/10.1002/ejsp.1906
[65] Romero, M., Craig, A. W., & Kumar, A. (2019). Mapping Time: How the Spatial Representation of Time Influences Intertemporal Choices. *Journal of Marketing Research*, *56*(4), 620–636. https://doi.org/10.1177/0022243719827967
[66] Sng, O., Neuberg, S. L., Varnum, M. E. W., & Kenrick, D. T. (2017). The crowded life is a slow life: Population density and life history strategy. *Journal of Personality and Social Psychology*, *112*(5), 736–754. https://doi.org/10.1037/pspi0000086
[67] Sýkorová, K., & Flegr, J. (2021). Faster life history strategy manifests itself by lower age at menarche, higher sexual desire, and earlier reproduction in people with worse health. *Scientific Reports*, *11*(1), 11254. https://doi.org/10.1038/s41598-021-90579-8
[68] Tam, L., & Dholakia, U. (2014). Saving in Cycles: How to Get People to Save More Money. *Psychological Science*, *25*(2), 531-537. https://doi.org/10.1177/0956797613512129
[69] Wang, Y., Lin, Z., Hou, B., & Sun, S. (2017). The intrinsic mechanism of life history trade-offs: The mediating role of control striving. *Acta Psychologica Sinica, 49*(6), 783–793. https://doi.org/10.3724/SP.J.1041.2017.00783
[70] Wang, I. M., Michalak, N. M., & Ackerman, J. M. (2021). Life History Strategies. In: Shackelford, T. K., Weekes-Shackelford, V. A. (Eds.), *Encyclopedia of Evolutionary Psychological Science*. Springer, Cham. https://doi.org/10.1007/978-3-319-19650-3_1926
[71] Wang, Y., Wang, X., Yang, X., Yuan, F., & Li, Y. (2023a). The influence of temporal focus on individual intertemporal decision-making in life history strategy framework. *Personality and Individual Differences*, *211*, 112250. https://doi.org/10.1016/j.paid.2023.112250
[72] Wang, Y., Wang, X., Yang, X., Yuan, F., & Li, Y. (2023b). View of Times and Temporal Focus under the Pace of Life on the Impact of Intertemporal Decision Making. *International Journal of Environmental Research and Public Health*, *20*(5), 4301. https://doi.org/10.3390/ijerph20054301
[73] Wicherts, J. M., Veldkamp, C. L. S., Augusteijn, H. E. M., Bakker, M., van Aert, R. C. M., & van Assen, M. A. L. M. (2016). Degrees of freedom in planning, running, analyzing, and reporting psychological studies: A checklist to avoid *p*-hacking. *Frontiers in Psychology, 7,* 1832. https://doi.org/10.3389/fpsyg.2016.01832
[74] Wittmann M. (2009). The inner experience of time. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, *364*(1525), 1955–1967. https://doi.org/10.1098/rstb.2009.0003
[75] Xiao, B., Xin, Z., & Wang, L. Covid-19's influence on life history strategy: Insights from cross-temporal meta-analysis and experimental research. *Personality and Individual Differences*, *219*, 112505. https://doi.org/10.1016/j.paid.2023.112505
[76] Xu, L., Chen, Q., Cui, N., & Lu, K. L. (2019). Enjoy the present or wait for the future? Effects of individuals' view of time on intertemporal choice. *Acta Psychology Sinica, 51*, 96–105. https://doi.org/10.3724/SP.J.1041.2019.00096
[77] Xu, X., Jia, M., & Chen, R. (2023). Time moving or ego moving? How time metaphors influence perceived temporal distance. *Journal of Consumer Psychology.* Advance online publication. https://doi.org/10.1002/jcpy.1370
[78] Xu, L., Zhao, S., Cotte, J., & Cui, N. (2023). Cyclical Time Is Greener: The Impact of Temporal Perspective on Pro-Environmental Behavior, *Journal of Consumer Research*, *50*(4), 722–741. https://doi.org/10.1093/jcr/ucad016
[79] Zheng, W., Liu, Y., Liu, C., Chen, Y. -H., Cui, Q., & Fu, X. (2019). The influence of event valence and emotional states on the metaphorical comprehension of time. *Frontiers in Psychology*, *10*, 410. https://doi.org/10.3389/fpsyg.2019.00410
[80] Zhou, L., Yang, Y., & Li, S. (2022). Music-induced emotions influence intertemporal decision making. *Cognition and Emotion*, *36*(2), 211–229. https://doi.org/10.1080/02699931.2021.1995331
[81] Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology, 77*(6), 1271–1288. https://doi.org/10.1037/0022-3514.77.6.1271