

**Time and time perceptions –  
Consequences for individual and collective outcomes**

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## Synopsis

### 1 The clock is not telling the whole story about time

Time is omnipresent and undoubtedly plays an important role in every person's daily life. All perceived cognitive and emotional experiences are linked to time. Without a sense for the progress of time, people do not possess a personal life story, an incentive to achieve a future goal, or a sense of mortality (Ornstein, 1997; Holman and Zimbardo, 2009; Grondin, 2010).

Time as a concept has been studied by various research fields, sometimes for millennia. Philosophers try to grasp the meaning of time. In book IV of *Physics*, Aristotle argued that the existence of time depends on the mind and described time as the degree of change to the before and after (Coope, 2005). Mathematicians try to calculate time, and physicists try to explain the relationship between time and reality. While Newton hypothesized that time is universal and the same for everyone (Newton, 1687), our understanding of time has shifted after Einstein's relativity theory, which describes time and space as relative, depending on the observer's speed (Einstein and Warburg, 1911). Moreover, biologists find that life-history traits can explain individual differences in animals' behavior by using time (Réale et al., 2010). Economists equate time with a resource, such as money or performance, since each individual is free to dispose of his or her time (Michelle, 1990). Sociologists and psychologists use time to explain social time implications regarding the future and try to model time (Lewin, 1951; Zimbardo and Boyd, 1999).

These days, time gains more and more importance because of the gradual acceleration in society (Rosa, 2003). Residents are moving out and in of their houses much more frequently than in the past. Computers work at higher speed, communication and information channels are getting progressively faster. Especially in behavioral science, time and temporal processes have been the subject of numerous investigations (e.g., Levine et al., 1980; Van Essen et al., 2012; Ma and Cheung, 2014; Ahmad et al., 2017; Chapman Jr et al., 2020; Srinivas, 2020), and time theories have been developed (e.g., George and Jones, 2000). However, the concept of time has mostly been applied without any particular structural order. Hence, the following information gives an overview of some widely discussed approaches to time, showing its multiplicity in previous research. Scholars analyze time, for instance, with the following focal points: (a) *punctuality* regarding cultural topics (Levine et al., 1980; White et al., 2011) or technology and monetary savings (Chapman Jr et al., 2020; Srinivas, 2020), (b) *waiting time* regarding health care processes (Umar et al., 2011; Van Essen et al., 2012; Ahmad et al., 2017), (c) *time pressure*

regarding decision making (Zur and Breznitz, 1981; Kocher and Sutter, 2006) or to what extent time pressure is discretionary and of people's own making (Andrews and Farris, 1972; Goodin et al., 2005), (d) *time management* behaviors regarding perceived control of time, job satisfaction, health, and stress (see a review of Claessens et al., 2007), and (e) *subjective duration of time* regarding aging (Friedman and Janssen, 2010; John, 2014; Ma and Cheung, 2014).

Moreover, according to Shipp and Cole (2015), time can be divided into two time-related constructs: The first construct "*How individuals use and manage time*" includes *time management* (Barling et al., 1996; Claessens et al. 2004, 2010), *polychronocity* (Hecht and Allen, 2005; Slocombe and Bluedorn, 1999), *time use* (DeVoe and Pfeffer 2007, 2011; McGrath and Tschan, 2004), and *pacing styles* (Gevers et al., 2006, 2013). The second construct "*How individuals think about time*" contains *temporal depth* (Bluedorn, 2002; Bluedorn and Martin 2008), *time urgency* (Waller et al., 1999; Jansen and Kristof-Brown, 2005), and *temporal focus* (Zimbardo and Boyd, 1999; Shipp et al., 2009; Guo et al., 2012). In this respect, one can assume that contemplating time and using and evaluating time are intertwined, affecting each other. Thus, by mentioning these time aspects, it is assumed that the clock is not telling the whole story about time.

Concerning the different approaches to time, it is reasonable to give a short review. On the one hand, time can be regarded as objective. It is then defined as progressing from past to present to future, homogenous in the sense of seconds, and absolute as it is constant across all humans or situations (Bluedorn, 2002; Shipp et al., 2009). One example of objective time is the *pace of life* index by Levine and Norenzayan (1999). This index measures time by quantifying walking speed, working speed, and clock accuracy. On the other hand, subjective time is defined as time that is cognitively cyclical, meaning that thoughts can move in various directions between past, present, and future. Moreover, moments can pass slower or faster, and subjective time is interpretive and influenced by individuals' experiences, personality, as well as cultural time-related and societal norms (see McGrath and Kelly, 1986; Shipp and Fried, 2014). In previous literature, subjective time is represented, for example, by the *temporal focus* in which people characteristically direct their attention to past, present, and future orientation (Bluedorn, 2002, Shipp et al., 2009, Zimbardo and Boyd, 1999). Some time aspects can be regarded as either objective or subjective depending on the research question. Giving an example, waiting time can be investigated with a focus on an objective and a subjective approach to time: On the one hand, when focusing on objective waiting time, we could count the waiting time before seeing

the doctor. However, on the other hand, we can also investigate subjective waiting time, by focusing on the perception of waiting time as a shorter or longer period. This subjective perception can, for example, depend on the environment and provided stimuli, such as interesting newsletter reports or television that informs you about the latest news as well as on individual characteristics, i.e., if the person questioned is patient or impatient (see also Bluedorn and Jaussi, 2008) highlighting temporal depth, as well as punctuality). Moreover, objective time seems to be independent of subjective time whereas subjective time may be influenced by clock time (objective time) as it continues without being affected by our perception (Shipp and Fried, 2014). This could provide one possible explanation as to why previous research on time has not been stringent in its differentiation.

In the last decades, scholars have mostly investigated objective time (Shipp and Jansen, 2021). Shipp and Cole (2015) encourage the examination of the potential roles of objective and subjective time as they propose an equally important subjective explanation of time. Subjective time can help researchers gain more in-depth insights concerning time because of the variety of interpretative aspects. This is supported by Shipp and Jansen (2021), who argue that “although objective time is continually passing, one’s present is always viewed through the lens of subjective time” (p.322). Tidström and Hagberg-Andersson (2012) affirm this notion by arguing that subjective time often overlaps and transcends objective time and that we, accordingly, need to move beyond conventional notions of calendar time to include objective as well as subjective time. Hence, in further research considering both objective and subjective time should be of importance.

As shown, time can take on different positions in research. This dissertation seeks to shed light on time as a predictor of various outcomes (McGrath and Kelly, 1986; Goodman et al., 2001). Thereby, the aim is to understand how objective time, in this case, the “pace of life” as well as subjective time, namely “time perspectives”, influence individual, team, and collective outcomes. As mentioned before, time has mostly been haphazardly applied to various topics. Shipp and Cole (2015) emphasize that scholars who investigated time have done this without a specific research approach. Therefore, they prepared a categorization of organizational literature by dividing it into four categories with low or high orientation on subjective and objective time. The categories are “temporal blind spot”, “clock-time dynamism”, “interpretive”, and “completely temporal”. These are depicted in Figure 1.

Thereby, the “*temporal blind spot*” at the bottom left in Figure 1 involves research that overlooks time completely or considers neither objective nor subjective time an important

factor. The main example of this category is a cross-sectional study design. This approach observes individuals only at a single point in time, thus neglecting potential effects over time. Moreover, a longitudinal design can also be put into this category since it observes individuals over multiple points in time. However, if the only temporal separation stems from the longitudinal design, it only discovers how things change over time and not how time itself impacts the results (Pitariu and Ployhart, 2010).

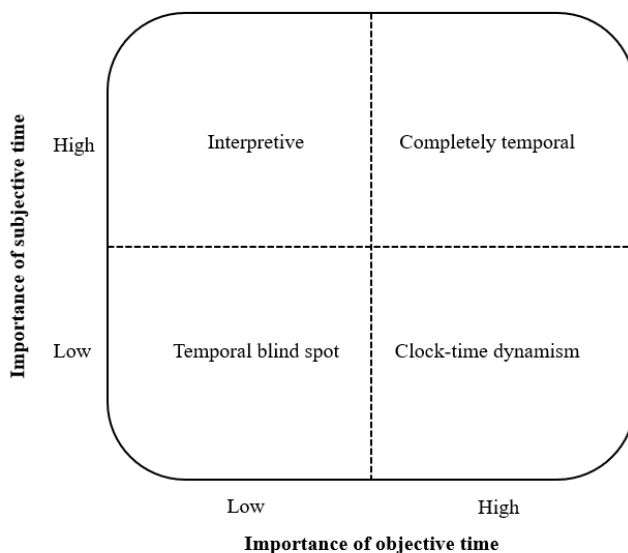
“*Clock-time dynamism*” on the bottom right in Figure 1 expands the “temporal blind spot” category by placing more importance on objective time measurement. Thereby, longitudinal designs with a focus on objective time and its effect on the relationships between the dependent and independent variables can be applied. In practice, this includes constructs, such as polychronicity for effects on performance (e.g., see Conte and Gintoft, 2005) and for job-related well-being (e.g., Hecht and Allen, 2005). These research streams emphasize that individuals regard or use time based on clocks or calendars (Shipp and Cole, 2015). Moreover, the individuals’ subjective perception of time is not of relevance in clock-time dynamism (Shipp and Cole, 2015).

The category “*interpretive*” at the top left side highlights research that focuses on subjective time. It deals with an individual’s perception of time (e.g., based on retrospection or anticipation) and how it affects certain outcomes. According to Shipp and Cole (2015) there used to be only few investigation streams related to this topic. However, regarding the relevance of subjective time, Shipp and Jansen (2021) found that this type of time research is of increasing interest in the context of management. In their literature review, 90% of the articles in their sample were published since 2000 and 39% of these in the last five years. In this field, perceived time use (DeVoe & Pfeffer 2007, 2011; Evans et al. 2004) and the temporal focus are used as subjective time constructs. The temporal focus classifies to which extent people characteristically pay attention to past, present, or future orientation (Shipp et al., 2009; Zimbardo and Boyd, 1999). Fried and Slowik (2004), for instance, showed that past, present, and future perception of individuals shape their capability to perform toward future achievements which cannot be represented by objective time (see also, Lord et al., 2015; Suddaby and Foster, 2017).

Finally, the “*completely temporal*” category at the top left side of Figure 1 includes literature on both subjective and objective time. This category integrates clock time with individuals’ perceptions of time to understand past, present, and future effects. According to Shipp and Cole (2015) this category contains only a few studies. One example is the longitudinal study of

Mitchell et al. (1997) who investigated the mental time-travel through anticipations and retrospections. They found that individuals anticipate certain types of experiences as more pleasant than they have actually experienced it at the time of occurrence and also remember these experiences in a more positive light than it actually was.

Some scholars argue that they detect a trend of more and more studies moving from “*temporal blind spot*” to the “*clock-time dynamism*” but the “*interpretive*” and “*completely temporal*” categories remain underexplored (Shipp and Cole, 2015). In addition, although discussing the approaches separately, Shipp and Cole (2015) used dashed lines in their visualization to show that these time concepts are not purely categorical and could still vary in degree (e.g., streams of research shifting from previously contemporaneous views to greater recognition of dynamism).



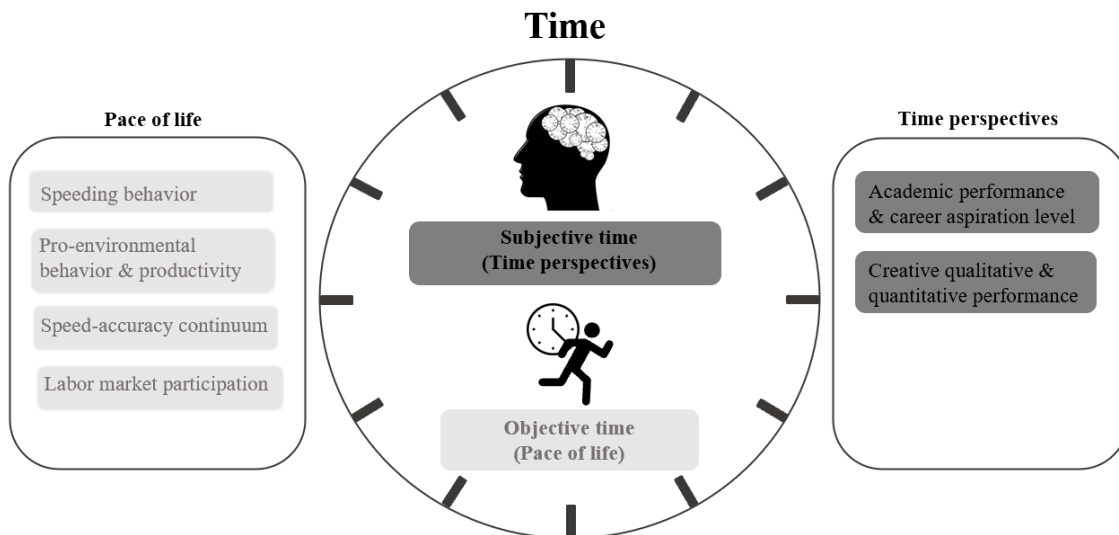
Source: Shipp and Cole (2015).

**Figure 1: Overview by Shipp and Cole (2015) giving an orientation of subjective and objective time in organizational literature**

Hence, the differentiation and categorization of research regarding time is in its infancy and may not have been definitively verified yet. For the purpose of this dissertation, giving a short overview regarding the papers consulted, one could categorize paper 1 and paper 2, which shed light on time perspectives, to subjective time. Thus, following the categorization by Shipp and Cole (2015), these papers could fall into the “*interpretive*” category whereas paper 3, 4, 5, and 6 focus on the pace of life which belongs to objective time and could, therefore, be categorized in “*clock-time dynamism*”.

## 2 Presentation of papers

As explicated in the first part of this chapter, there are various approaches to how scholars reflected on time in previous scientific discourse. In the next step, I will highlight the differentiation of time applied in this dissertation – differentiating the papers into subjective time, by focusing on “time perspectives”, and objective time, by including the “pace of life”. Figure 2 gives an overview of the main relationships investigated in this dissertation. In the center of this figure sit the two main concepts of time: subjective time (in dark gray) and objective time (in light gray). The main dependent variables considered are listed in colored boxes at the left and the right side of the time constructs. These have the aim to answer the question if a certain influence of time perspectives (subjective time, dark gray) or pace of life (objective time, light gray) can be found and, therefore, may extend the scientific discourse.



Source: own visualization.

**Figure 2: Overview on the relationships investigated in this dissertation.**

### *Subjective time*

On the one hand, time is described as *subjective time*, in other words, lived or psychological time. In this case, time is processed by the individual human mind. Subjective time focuses especially on how individuals subjectively experience, perceive, or interpret time (Gorman and Wessman, 1977). This subjective time has been investigated, for instance, in terms of subjective duration of experience, time personality, time intensity, time congruity, time urgency, as well as time perspectives (McGrath, 1988; Zimbardo and Boyd, 1999; Waller et al., 2001; Boniwell, 2005). The work of McGrath (1988) combines empirical and experimental data, integrative

treatments of research literature, and powerful conceptual analyses of theoretical issues to provide an approach to the social psychology of time. Waller et al. (2001) analyzed the effect of individual perceptions of deadlines on team performance as organizations are increasingly steeped in speed. They analyzed how differences in individual time urgency and time perspective influence the team members' perceptions of a deadline. From their results, they derived four time perception prototypes for team members: the organizer (an individual which is time urgent and has a future time perspective), the crammer (an individual which is time urgent and has a present time perspective), the relator (an individual which is not time urgent and has a present time perspective) and the visioner (an individual which is not time urgent and has a future time perspective). The study further examines how these prototypes influence the team's ability to meet that deadline. A study from Boniwell (2005) shows that an individual's balanced perspective on time is associated with the highest levels of well-being. Moreover, she examined the concept of perceived time use and found four factors influencing how people spend their time and how satisfied they are with it: liking what one does and perceiving it as worthwhile, balance, responsibility and achievement, as well as time anxiety and lack of control. Moreover, several reviews contain the meaning of time use (Feldman et al., 2020), as well as trait versus state differences (Tang et al., 2020). However, up to now, no cumulative body of research regarding subjective time has been established.

Regarding subjective time, this dissertation sheds light on time perspectives. The term "time perspective" is broad since various definitions exist. McGrath and Kelly (1986) found over 200 approaches to define time perspective, which demonstrates the relevance of the topic. Lewin (1951) was one of the first to shape the term "time perspective", defining it as a combination of individual views regarding the psychological future and past that exist at a particular point in time. Lewin's model highlights that the past and future have an impact on current individual behavior (Lewin, 1951). His theoretical construct was later extended by Zimbardo and Boyd (1999), who consolidated its impact on psychological literature. Psychologists argue that it is possible to include temporal orientation, experiences, and attitudes as persisting personality traits (Gorman and Wessman, 1977). Hence, the definition of time perspectives can be regarded as a process in which personal experiences flow into psychological time frames of past, present, and future (Nuttin 1964; Zimbardo and Boyd 1999). Zimbardo and Boyd (1999) define time perspectives as "[...] the often non-conscious process whereby the continual flows of personal and social experiences are assigned to temporal categories, or time frames, that help to give



order, coherence, and meaning to those events” (Zimbardo and Boyd, 1999, p. 1271). Thus, time perspectives could also be associated with cognitive processes.

Individuals are not as aware of this time-oriented trait as other personality traits, such as extraversion or conscientiousness. Focusing on the psychological time perspective theory, Zimbardo and Boyd (1999) categorize individuals into particular “types” by dividing the time orientation of individuals into five time perspectives: future, present-hedonistic, present-fatalistic, past-positive, and past-negative. These time perspectives are derived from a series of exploratory studies by using focus groups, feedback from participants, and theoretical considerations (Zimbardo and Gonzalez, 1984; Gonzalez and Zimbardo, 1985; Zimbardo and Boyd, 1999). According to the characteristics of these time perspectives, the future orientation is characterized by thinking about future aims and working on goals motivated by future rewards. The present-hedonistic orientation characterizes present enjoyment and excitement while ignoring future consequences. Individuals with present-fatalistic orientation, possess a belief in predestined future, as well as the importance of fate, which leads to the resignation of present actions. Lastly, the past-negative orientation reflects a generally negative, aversive view of the past whereas past-positive represents a warm and sentimental attitude toward the past (Zimbardo and Boyd, 1999). The time perspective inventory has high predictive, discriminant and convergent validity (Zimbardo and Boyd, 1999) and has been validated in several countries (see a review of Sircova et al., 2014).

Additionally, the time perspectives are one of the most powerful influences on many aspects of human behavior, as they can shape the quality of individuals’ lives (Boniwell and Zimbardo, 2004; McKay et al., 2015). Time perspectives and the individual preferences that depend on them influence present behavior including everyday decisions, judgments, and actions (Zimbardo and Boyd, 1999). Moreover, time perspectives or the temporal focus are developed at early stages in life through influences of familiar background, parental beliefs about time, childhood experiences, social class, education, national culture, and religion (McGrath and Tschan, 2004; Trommsdorff, 1983). The time frame of an individual can also be affected by learning processes, peer interactions, and other conditions that promote a habitual focus on one or more time perspectives and omitting the others (Nurmi, 1991; Zimbardo and Boyd, 1999, 2008). Zimbardo and Boyd (1999) agree that, although time perspectives may be affected by situational forces, such as inflation, experiencing survival stressors, or being on vacation, it can also develop a dispositional characteristic since a particular temporal bias comes to predominate a person’s response hierarchy (Zimbardo and Boyd, 1999). Gupta et al. (2012) support these

findings by stating that 71.6% of individuals in their study were predominantly anchored in one of the five time perspectives.

This dissertation addresses subjective time in terms of time perspectives on individuals, as well as teams: (1) Paper 1 investigates the understanding of individual time perspectives and academic performance. It also analyzes the relationship between time perspectives and future aspirations levels, especially certainty about future career choices, as well as the aspiration to claim the position of a manager in the future. (2) Paper 2 investigates the impact of future orientation in teams and their performance in a simple incentivized creative task, by measuring team performance in terms of quantity, quality, and overall payout. In the following, I shed light on the relevance to investigate these relations, outline the main results, and summarize how these papers extended the state of the art regarding time perspectives.

**(1) J.A. Hoppe (2021)**

“Individual’s Time Perspectives and its Relation to Academic Performance and Career Aspiration Levels”.

The relevance of this paper consists in questioning why some individuals achieve a better performance than others (Barnett et al., 2020; González et al., 2020). Previous studies found that personality traits, (e.g., the Big Five) influence academic performance (Stajkovic et al., 2018). Lately, psychologists have shifted their attention to other possibly influential characteristic traits, and some scholars have proposed time perspectives as such a stable trait. Therefore, I investigated if time perspectives influence academic performance, as well as certainty about future career choices and future career aspiration levels, by applying the approach of Košťál et al. (2016) to measure individual time perspectives. They extended the basic conception and inventory proposed by Zimbardo and Boyd (1999) by further differentiating the future time perspective into future-positive and future-negative. I used a unique dataset of 471 students from two German universities. By using linear regressions, this study shows that more future-positive oriented students reach on average a significantly better grade point average in course of study whereas more present-hedonistic oriented students achieve a significantly lower academic performance. By finding this effect of present-hedonistic oriented individuals, the study extends the state of the art of previous literature on academic performance with reference to Zimbardo and Boyd (1999), who found the same relation which, however, was not statistically significant.

Moreover, by using Tobit and ordered probit regressions, this study finds that more future-positive orientation increases the likelihood of aspiring to be a manager in the future, as well as the individual's certainty about future career choices. Furthermore, results indicate that more future-negative orientated individuals are more likely to be uncertain about future career choices. With these findings, the study contributes the state of the art by highlighting the importance to differentiate the future time perspective into future-positive and future-negative. Moreover, it finds that more future-positive orientation, as well as more present-hedonistic orientation, increase the likelihood of aspiring to be a manager in the future.

This may lead to the assumption that future and present time perspectives have a significant influence on present academic performance and future career aspiration levels. Thus, certain time perspectives may be an indicator for individuals to understand why they achieve a certain academic performance or why they have higher or lower future career aspiration levels. Consulting the time perspective scale to gain a more precise insight regarding the performance, as well as the future career aspiration levels, of their employees offers practitioners and lecturers a deeper understanding to personalize working or teaching environments.

## **(2) J.A. Hoppe, T. Auer, K. Thommes (2021)**

“Future Orientation and Team Performance in Creative Tasks”.

One of the most important aspects regarding team performance is the composition of team members, especially when collaborating in teams to produce creative output (Pirola-Merlo and Mann, 2004; Taggar, 2001). On the team level, various studies precipitated that the Big Five characteristics, such as extraversion or conscientiousness, influence the performance in a creative task setting (e.g., Robert and Cheung, 2010). Until now, only primary research has been conducted regarding the perception of time as an explanatory factor for productivity in creative tasks. However, a study by McKay and Gutworth (2019) advocates for such research. Yet, existing research regarding the relationship of team performance and future orientation as a particular time perspective omits the focus to creative performance altogether (Mohammed and Nadkarni, 2011; Abrantes et al., 2020; Gupta and Bakker, 2020).

Therefore, we measure performance in creative tasks in a pre-experimental research design, capturing team performance instead of individual performance, and shed light

on whether more future-oriented teams influence the qualitative and quantitative performance, as well as the overall performance, in creative tasks. For this purpose, participants received a deck of cards with terms and material to build these terms. They were limited to 4 minutes to build as many as possible. Afterward, the participants got a payout which was composed of the qualitative (raters decided how well terms were illustrated, on average) and quantitative (achieved number of terms in the given time) performance of each team.

Using Tobit regressions, we find that teams with a higher future orientation reach a significantly better qualitative performance. However, we detected no statistically significant effect for quantitative performance. Using a linear regression for the overall performance (payout from the qualitative and quantitative performance combined), the results suggest that future orientation has a significant positive effect on the overall performance, as well. Hence, we contribute to the existing discourse by showing that the future orientation of members in a team serves as a significant indicator to predict team performance in a creative task. While we focused on the specific issue of team performance in a creative task with limited time and resources, our results may be useful for practitioners as we can now transpose positive effects of higher future orientation in teams to a domain that is highly relevant for organizations, namely the process of innovation with given resources.

### *Objective time*

On the other hand, time can be seen as an *objective construct*, e.g., as the clock or geographical time. This depicts time as a linear continuum that can infinitely be divided into objective, quantifiable units which are uniform, precise, homogeneous, and measurable (Ancona et al., 2001). Objective time is, for example, applied in time budgets or in research on time use (Robinson, 1999; Pentland et al., 1999). One objective time construct that is relevant for this dissertation is the pace of life index introduced by Levine and Norenzayan (1999). They measured this index by examining three indicators across different countries: First, the average *walking speed* which was measured over a distance of 60 feet in downtown locations in each considered city. Second, the *working speed* which measured the time it took postal workers to complete a simple request. And third, the *clock accuracy* which measured 15 public clocks in selected downtown banks. Thus, Levine and Norenzayan (1999) investigated the pace of life index in 31 countries and found that Western Europe holds the fastest pace of life whereas non-industrialized countries, such as those in Latin America or Asia, possess the slowest.

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Accordingly, these results highlight that faster-paced countries often experience higher economic outcomes and exhibit faster perceptions of time.

This dissertation addresses objective time by applying the pace of life index: (3) Paper 3 investigates the relation between a slow or fast pace of life of individuals and speeding behavior. (4) Paper 4 questions whether the individual pace of life is associated with an individual's productivity and pro-environmental behavior. (5) Paper 5 examines whether a high or low pace of life can be used to identify heterogeneity in an individual's strategy to place more weight on either fast or accurate accomplishments. (6) Additionally, paper 6 shows whether mismatches in the pace of life may contribute to an explanation of migrants' comparatively worse labor market participation. In the following, I elucidate the relevance of investigating these relationships regarding the pace of life by showing the papers' main results and summarizing how they extended the state of the art.

**(3) C. Goldbach, C. Hoffman, J.A. Hoppe, T. Pitz, K. Thommes (2020)**

“The fast and the furious—An experimental investigation of the pace of life and risky speed choice in traffic”.

Regarding the objective time, this paper uses the pace of life to explain whether this index is associated with individuals' speeding decisions. Until now, no comparable research on human behavior and the pace of life has been conducted that can be consulted to derive our hypotheses. However, there are several studies in biological literature showing that the pace of life influences animals' speeding behavior. One animal that can be given here as an example is the snake. Fast-moving snakes are less likely to exploit their territory and stay on their habituated paths whereas slow-moving snakes eventually discover their territory (Gangloff et al., 2017). The pace of life relates to the classical fast-slow life-history continuum, which presumes a between and within species-variation in physical attributes, e.g., metabolism causes variation in behavior (Réale et al., 2010). Moreover, previous literature supposes that risk behavior is associated with the physical pace of life, as well. For instance, the high pace of life of some animals is linked to high risk-taking behavior and lower needs of exploration (Koolhaas et al., 1999).

As speeding is still a pertinent problem concerning e.g., road safety and greenhouse gas mitigation this study aims to understand whether the pace of life can also contribute to our understanding of human speeding behavior in traffic. Therefore, we need to gain a better understanding of who is prone to such speeding behaviors. For this purpose, we used a novel speed-choice experiment in which participants were repeatedly confronted

with the scenario of choosing to drive either fast or slowly to get from A to B by adding different accident risks. We used groups of 10 participants, where the risk to have an accident also depends on the speeding decision of these 10 participants.

Our results, obtained by using random-effects probit regressions, suggest that individuals with a slower pace of life are more likely to choose driving slowly in the experiment. This is in line with biological research, showing that species with a higher pace of life are more likely to move faster, e.g., concerning tongue flicking behavior in snakes (Gangloff et al., 2017). Additionally, by using random-effects probit regressions, we find that individuals with a higher pace of life are less likely to change their strategy, even after having experienced a loss. In contrast, slow-paced individuals are more likely to switch to a slower speed, even when they experienced success by driving fast in the preliminary round. To sum up, high-paced individuals are more likely to make risky choices, as well as to stick to once-established routines. Slow-paced individuals are more likely to explore different choices but also more often choose the less risky alternative. Thus, individuals' pace of life contributes to our understanding of speeding decisions.

Our results are in line with recent biological studies on the pace of life, and our experiment is – to our knowledge – the first applied to humans to find a relation between habituation tendencies and the pace of life. This association is particularly interesting as the tendency to explore new strategies or stick to one chosen strategy is relevant not only for traffic decisions but also in other situations, such as economic activities, like entrepreneurship and strategic decisions.

#### **(4) C. Hoffmann, J.A. Hoppe, N. Ziemann (2021)**

“Faster, Harder, Greener? Empirical Evidence on the Role of the Individual Pace of Life Affects Productivity and Pro-Environmental Behavior”.

Especially in times of general acceleration in society (Rosa, 2003; Chesley, 2010), individual's time perceptions may be crucial to understand how individuals behave. The acceleration processes in a society can be distinguished into two sides: On the one hand, faster living is beneficial when it comes to economic prosperity (Bhagwati, 2004), but, on the other hand, it influences, among other things, social alienation. This describes that many people experience mental overload, which leads them to focus mainly on the realization of their goals. They try to reach these goals as soon as possible while perceiving a diminished social responsibility (Milgram, 1970). Another hazard of the

acceleration of society is that people do not take time to live sustainably. This is indicated in the study of Pearson (2011), who finds that the distractions in modern life lower individuals' interest in growing their own food or preparing balanced meals. According to these prevailing problems regarding the acceleration in society, we question in this study whether productivity and pro-environmental behavior are influenced by a faster or slower pace of life among individuals.

We used a controlled laboratory experiment to understand how the individual pace of life influences the productivity of participants measured in a real-effort task as well as the degree of pro-environmental behavior measured by the share of the total private payoff given to a tree-planting project. By using OLS regressions, we find that individuals with a fast pace of life are significantly more productive. Moreover, the results of the Tobit regressions indicate that an individuals' fast pace of life is linked to less pro-environmental behavior. Additionally, when highlighting individuals with a fast pace of life, women behave significantly more pro-environmentally compared to men. However, this linkage is reversed when regarding participants with a slow pace of life.

To the best of our knowledge, this is the first experiment that sheds light on the individual pace of life and explores whether the pace of life is associated with productivity and pro-environmental behavior. Thus, our investigation extends the existing scientific research by providing possible solutions for environmental issues and the acceleration in society by aiding the interpretation of individuals' behavior. Van der Loo and Van Reijen (1992) divide the types of acceleration into four different perspectives relating to social structure, culture, personality type (pace of (social) life), and the relation to nature. Rosa (2003) applies this approach to highlight that there are "declaratory perspectives" for social structure, culture, and personality type, whereas, there is no complementary deceleration, even with respect to nature. He only proposes the possibility that environmental disasters could decelerate exogenously. One option is the "a-growth" strategy which shows an indifferent attitude toward growth. According to Van den Bergh (2011), even an ex-ante focus on public policy might be the best strategy since it is lastly more likely to receive the necessary democratic-political support. In this context, he argues that social scientists should consider systematic solutions to attain social-political acceptance. Our results additionally help to explain individual pro-environmental behavior that is required in order to "understand the dynamics of the Anthropocene" (Schill et al., 2019).

**(5) C. Hoffmann, J.A. Hoppe, N. Ziemann (2021)**

“The Hare and the Hedgehog – Experimental Evidence on the Individual Pace of Life and the Speed-Accuracy Continuum”.

Until now, studies indicate that speed goes at the expense of accuracy, e.g., Freeston and Rooney (2014) find that athletes lose accuracy when throwing a ball with increasing speed. However, to the best of our knowledge, no research has been conducted on an individual’s pace of life that investigates whether this index can be used to identify heterogeneity in individuals’ strategy to choose either fast or accurate accomplishment (see also Goldbach et al., 2020 regarding the heterogeneity in individuals’ strategy by focusing on the pace of life and speeding behavior in traffic). Yet, we have gathered from biological literature that the pace of life syndrome is frequently used to explain differences in the behavior within and between species; for instance, animals with short lifespan risk to make mistakes more often than animals with a longer lifespan (see, e.g., Wiersma et al., 2007). Hence, our investigation intends to understand if individuals characterized by a faster pace of life accomplish more tasks than slower-paced individuals. Moreover, we posed the question of whether individuals with a faster pace are less accurate and make more mistakes than slower-paced individuals. We also sought to determine if either strategy proves to be more successful, or if the middle ground between “being fast” and “being accurate” provides the best outcome.

In a controlled laboratory environment, we quantified the participant’s pace of life. Furthermore, we recorded the individual’s performance on an incentivized real-effort task. Moreover, we observed the behavior of individuals in three situations that are common in the daily life of all individuals to derive the individual pace of life: walking a certain section, completing an action that was comparable to logging in to online services, and answering a questionnaire. In this context, we ascertained that the individual pace of life differed across participants. We found that individuals with a faster pace of life accomplished more tasks in total. At the same time, they were less accurate and made more mistakes than those with a slower pace of life. Hence, the pace of life can be consulted to identify an individual’s type as measured on the speed-accuracy continuum. In our specific task, placing more weight on speed instead of accuracy paid off. Individuals with a faster pace of life were ultimately more successful with regard to their monetary revenue. Thereby we found many criteria of the pace of life which matched with a personality trait.



Hence, we extended the state of the art by approximating that the pace of life may, with more supporting studies in future research, be established as a personality trait that can be utilized to predict human performance on tasks characterized by a speed-accuracy trade-off. We conclude that an individual's pace of life may serve as an appropriate approach to identify the individual's type in terms of position along the speed-accuracy continuum at this specific task.

**(6) J.A. Hoppe, K. Thommes (2021)**

“Do Differences in the Pace of Life Contribute to an Explanation of Migrants’ Labor Market Participation?”.

In many countries, migrants show higher unemployment rates and lower wages compared to natives (see, e.g., Kahanec and Zaiceva, 2009). This can be explained by various causes, for instance, human capital differences or discrimination. Moreover, migrants may also differ from natives in terms of adherence to social norms in their current environment. Antecol (2000), for example, finds that the labor force participation in the host country may depend on value-differences, which are deeply ingrained in the country of origin. This stream of research emphasizes the factor of culture (different attitudes with respect to the family structure and the role of women in the labor market), which cannot be acquired through human capital measures since they represent an imprinted value. Furthermore, he highlights lower labor market participation rates for second- and higher-generation migrants in comparison to natives, which indicates a slow process of cultural adaptation. In this context, our paper researches whether a gap between individual's pace of life and the pace of life at the labor market in a country contribute to our understanding of lower migrants' employment rates. We focus, particularly, the pace of life index of 25 countries (Levine and Norenzayan, 1999), to analyze whether this index is associated with labor market outcomes of migrants in Germany. In the course, we focused especially on the effect of asynchronistic paces of life between migrants and the German labor market and investigated whether parts of the migration-employment gap can be explained by differences in the pace of life. Germany can be considered a relevant example as it has received comparably large and heterogeneous migration flows over a long period (Destatis, 2018). We hypothesized that the greater the difference between the individuals' early familiarized home country pace

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of life and the pace of life in the society of the current residence country, the less likely an individual is to be fully integrated into the labor market.

By using probit regressions, we compare “full-time employment” (=1) with part-time employment, marginal employment, and no employment (=0) as well as “any employment” which includes full-time employment, part-time employment, or marginal employment (=1) with being unemployed (=0). The models reveal a significantly lower labor market participation the higher the pace of life difference is. This confirms that a larger difference in the pace of life between country of origin and country of residence lowers the probability of labor market participation for full-time and any employment. Furthermore, this effect remains significant even when controlling for other factors that also influence the likelihood of labor market participation such as years of schooling, age, gender, health und size of hometown in the country of origin.

Our results advance the scientific discourse by indicating that objective time perception namely “pace of life” may be an indication to explain why some migrants have a lower participation rate at the German labor market than others even by shedding light on the difference in the pace of life index. Hence, our study introduced a new possible explanation for the migrant employment gap, namely differences in the pace of life, which may contribute to our understanding of migrant labor market integration. Thus, besides discrimination and human capital differences, also differences in the origin country’s pace of life and the host country’s pace of life may be a possible explanation for the migrant employment gap.

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