Waiting Experience And Reversal Theory

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Waiting time is an important part of the journey for train passengers but little is known about the waiting experience and how this is related to the waiting environment and time perception. A few studies have been published over the years on how the process of estimating time actually works. The most important of these studies were the *storage size* model (Ornstein, 1969) and the *attentional* model (Zakay, 1989).

Storage size model

Ornstein (1969) presupposed that the sense of time in retrospect is a positive linear function of the complexity of the number of stimuli. He employed the metaphor of *neurological storage capacity* and alleged that time takes longer the more units of information (*discrete events*) are stored per event, the more events take place, the more events differ from one another and the more complex events are. Hence a period in which nothing seems to happen seems (in retrospect) to have passed more quickly than one in which many different and complex activities took place. The more attention we pay to external stimuli, the more impressions we gather that we can remember and even more subjective time can be ascribed to all those memories whereby the period seems to have lasted longer.

Attentional model

Zakay (1989) hypothesized that time estimation in prospect is a cognitive process whereby each stimulus is perceived by two processors:

1. a timer that processes time information, and
2. a processor that processes timeless (i.e. not time-bound) information.

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Apparently, during an interval, attention can be processed in both ways. Temporal processing implies that people are consciously aware of the passing of time (for example, by guessing how long one has already been waiting). Non-temporal processing is the pondering on issues that are not time-related. The more temporal information is processed, the longer the interval seems. Pleasant surroundings, information, activities and other forms of distraction result in less information being temporally processed, which in turn reduces the perceived waiting time.

Overall design of studies

According to the Stimulus Organism Response (SOR) model (Mehrabian & Russell, 1974) environmental stimuli influence cognitive and affective processes which in turn determine approach or avoidance behaviour. The environment influences through its degree of arousal the *hedonic tone,* the sense of *control* and the *waiting experience*. Together these three factors determine approach or avoidance behaviour. Depending on the context, two levels of optimal stimulation can be distinguished that influence the hedonic tone (Apter, 2007). The combination of the number of environmental stimuli (few or many) with density (quiet or busy) or motivational orientation (must = hasty or lust = not hasty) determines how passengers experience the platform and the wait.

Nine (field and VR) studies were completed that distinguish between two different environments: a stimulating versus a calming one. A calm environment was created with environmental stimuli, such as cool colours, dimmed lighting, soft music, little distraction and few people on the platform. A stimulating environment, on the other hand, was created with warm colours, a high light intensity, stimulating (up-tempo) music, distraction and many people on the platform. We expected a stimulating environment to result in a lower hedonic tone for must passengers than for lust passengers.

Various authors have ascertained that the degree of congruence of the number of stimuli in relation to the goal-directedness of the consumer or the experienced crowding determines the experienced pleasure. According to Massara, Liu and Melara (2010), a high level of pleasure is attained with an optimal level of *activation*. Goal-directed consumers experience more pleasure with little arousal and much dominance (*hypo-activation*) and non-goal-directed consumers experience more pleasure with much arousal and little dominance (*hyper-activation*). Many environmental stimuli, such as a busy platform, demand a great deal of mental attention and can be experienced as too stimulating, whereas lack of stimuli (i.e., on a very quiet platform), can be felt to be tedious. By combining the arrangement of Massara et

al., (2010) with the *states* of Apter's reversal theory (2007), the following four groups can be distinguished (see Figure 1):

- Many stimuli + crowded + must: non-congruent → *Anxiety*
- Many stimuli + crowded + lust: congruent → *Excitement*
- Few stimuli + quiet + must: congruent → *Relaxation*
- Few stimuli + quiet + lust: non-congruent → *Boredom*

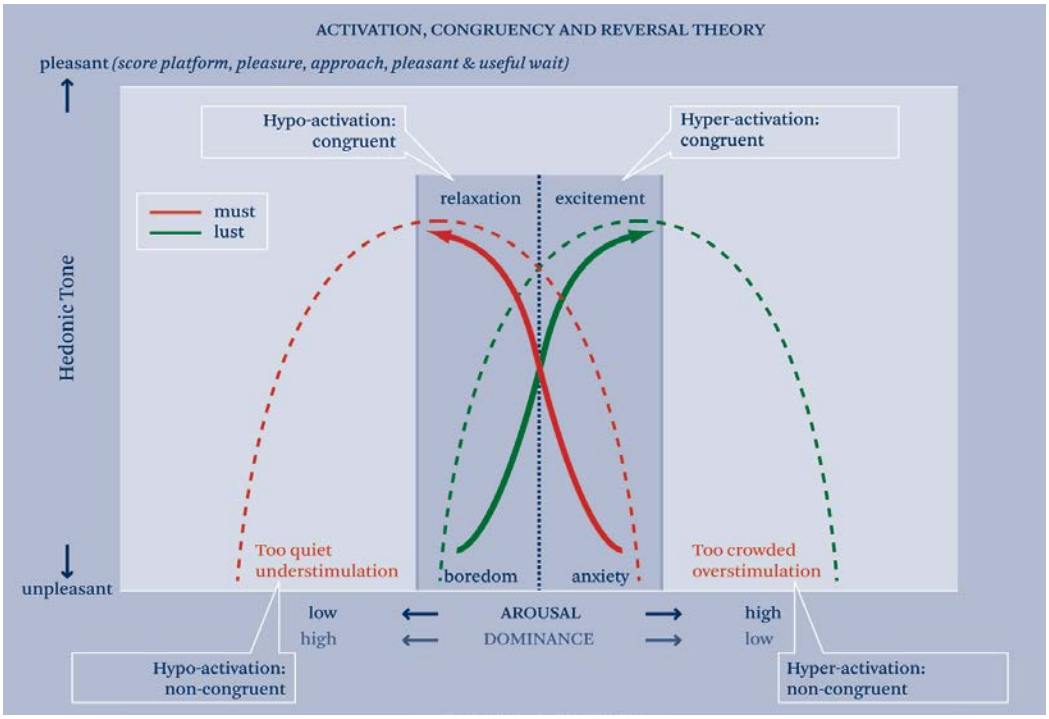

Figure 1 Elements of research design

Overall, the nine studies revealed that when platforms are busy, the number of stimuli should be minimized , but when it is quiet, stimuli should be added. For instance, at quiet moments passengers experienced greater pleasure when stimulating music was played, whereas at busy moments it was the other way round (i.e., greater pleasure when calming music was played). Warm stimulating colours (i.e., red and yellow) were associated with pleasure, but only for lust (non hasty) passengers. In contrast, must (hasty) passengers leant more towards the calming colour blue. These findings concur with those of Massara, Liu and Melara (2010), and can be successfully explained with r*eversal theory* whereby *mildly incongruent* stimuli afford the most positive station evaluation and waiting experience. It became evident that stimulating music, warm colours and advertising at quiet moments result in greater pleasure than calming music, cool colours and no advertising.

Environmental stimuli and time perception

The studies also demonstrated that waiting time sometimes seems to pass more quickly in an environment with few stimuli as well as in an environment with many. Time seemed to pass more quickly with the barely stimulating colour blue and dimmed lighting, whereas in the music and infotainment studies time appeared to pass more quickly with stimulating music and fast screen changes on a busy platform. Several explanations may be given for these (apparently) opposite results. For example, we know that conscious attention plays a role when estimating time. Zakay and Block (2004) concluded that the various (pro- or retrospective) research methods determine what holds people's attention, namely the time or other activities. Conscious attention to the time also played a role in our studies, albeit that any contrast was determined by the kind of environmental stimuli. Although every stimulus in the environment is perceived and influences behaviour, selective attention allows only few to reach our consciousness. When environmental stimuli are barely consciously perceived (such as cool colours and a low level of lighting) one's attention is not consciously distracted from the time. However, a more stimulating environment (warm colours, high level of lighting) does afford more information processing. Ornstein's *storage size model* (1969) might offer an explanation here, comparable as it is to the retrospective approach in which more information processing results in a longer estimation of the duration.

When attention is consciously distracted from the time, such as with music, advertising and infotainment, passengers notice their environment more and can even experience a moment of 'flow'. As less *processing capacity* remains to follow the time, it seems to pass more quickly. Here, in accordance with the *attentional model*, and as with the prospective approach, distraction from the time affords a shorter estimation of the duration.

Although Apter's reversal theory (2007) paid no attention to the experience of time, it might still explain our findings. Both few and many stimuli can afford a higher hedonic tone in the shape of relaxation (few stimuli) or pleasure (many stimuli) and make time seemingly pass more quickly. Our studies have shown that the test subjects indeed experienced greater pleasure not only with dimmed lighting but also with stimulating music, advertising and infotainment.

Combining aforementioned explanations implies that as satisfied passengers do not pay attention to the time, it seems to pass more quickly (*attentional model*). Relaxed passengers neither (consciously) heed the time nor their surroundings and are probably so deep in thought that they also estimate the time as shorter (*storage size model*). Figure 2 visualizes the

relationship between hedonic tone, attention and waiting experience. It also clearly demonstrates that passengers with a low hedonic tone overestimate the time because they are bored due to a long wait (*ironic monitor/assimilation theory)* or because the wait itself induces stress (*stress management theory*).

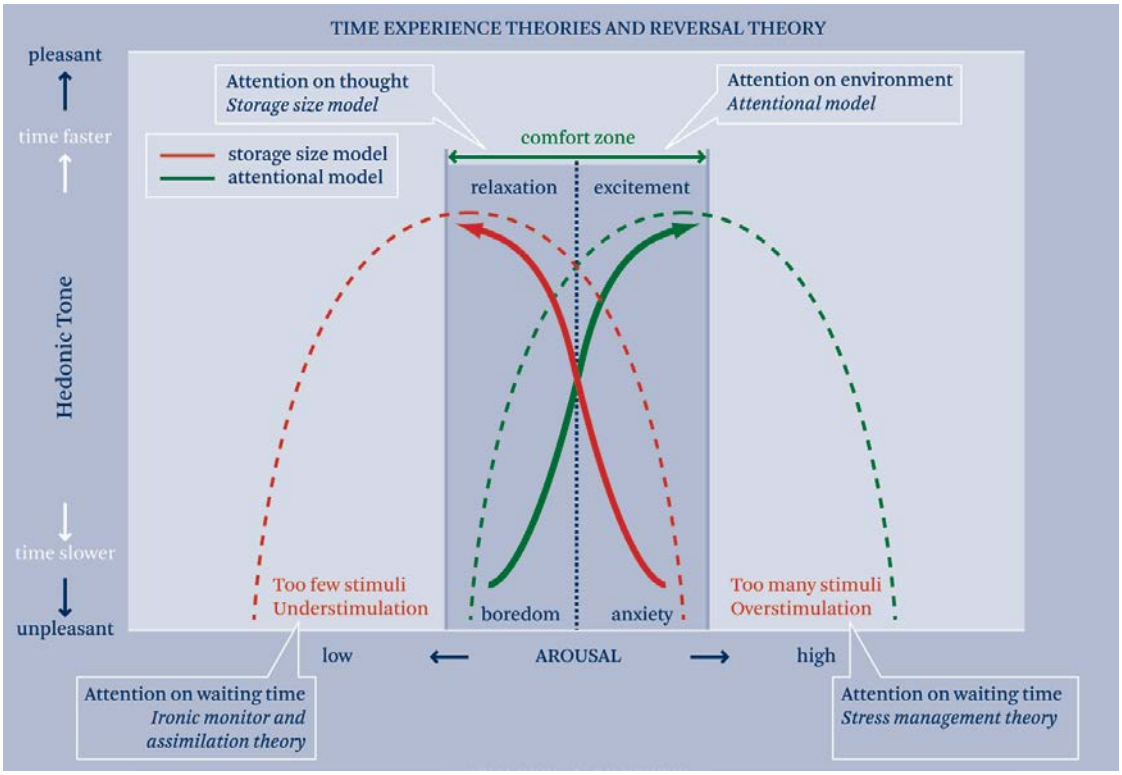

Figure 2 Relationship research findings and theories on waiting time

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