

## Article

# “Just Think” — Students Feel Significantly More Relaxed, Less Aroused, and in a Better Mood after a Period of Silence Alone in a Room

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**Abstract:** A series of studies by Wilson and colleagues in 2014 suggested that participants (mostly students) did not enjoy a 6 to 15 min silent period of “just thinking”. Students in our study ( $n = 64$ ) similarly spent a period of silence (6:30 min) alone in a room with nothing to do but concentrate on their own thoughts. They sat on a chair facing the door. Unlike the study by Wilson et al., the students felt significantly more relaxed, less aroused, and in a better mood after this period of silence. The subjects did not experience boredom; they were mostly present-oriented and judged that the time had passed quickly. A reason why the students in our study managed a silent period of time just thinking compared to the Wilson et al. study may be due to intercultural factors. Another reason could be that our student sample was already acquainted with aspects of emotional self-awareness owing to their specific study programs and curricula (mostly education, inclusive education, social education). On the basis of such possible influences, the variety of responses our subjects reported for a period of “just thinking” merits further investigation.

**Keywords:** relaxation; silence; time perception; boredom; waiting

## 1. Introduction

Daydreaming, mind-wandering, and boredom are topics which have recently received an increasing amount of research in the scientific community. These terms refer to “empty time”, an interval of lived time that is not filled with distracting activities or explicit tasks, and during which individuals experience a variety of affective states, often described as boredom. Waiting situations, are common features of modern human life, for example, at airports and train stations or in traffic jams, or when customers wait for certain services. They have nonmonetary costs and are usually perceived negatively [1,2]. We may feel distressed without distraction from modern media (e.g., smart phones) because the mind becomes disengaged. In such situations, individuals report a subjective slowing down of time as an intrinsic feature of the overall feeling of boredom [3,4].

What does really happen when we have to wait without a distraction? A recent series of studies by Wilson and colleagues [5] published in the journal *Science*, has led to a conceptual debate. In 11 studies with a sample size of approximately 900 participants (mostly students), Wilson et al. focused primarily on how subjects enjoyed and judged a period of time (6–15 min) when left alone in a room with nothing but their own thoughts. We were most interested in studies 1 to 10 and outline them here in detail. In studies 1 to 6, participants first had to hand in all their possibly distracting belongings (cell phone, writing implements, etc.) and were then asked to spend a period of time occupying themselves with their own thoughts. The only other rules were that they should stay seated and awake. Results showed that subjects felt it was difficult to concentrate (57.5% at or above

the midpoint of the scale), their minds wandered (89.0%), and half of the subjects reported average or below-average enjoyment of the experience (49.3%). In study 7, participants were allowed to perform the study at home via web-based options. This time, the average judged enjoyment was even lower, and subjects found it more difficult to concentrate at home than under laboratory conditions. In study 8, participants were randomly assigned to conditions and therefore either engaged themselves with their own thoughts or performed a diverting activity, such as reading an enjoyable book, listening to music, or spending time surfing the Web. According to Wilson et al., subjects rated the external activities as far more enjoyable than “just thinking”. It was also easier to concentrate, and there was less mind-wandering. Whereas studies 1 to 8 included students as participants, study 9 consisted of community participants. Similar to study 7, these community participants performed the study online at home. The results correlated with those of study 7, indicating that the subjects’ ages, education levels, incomes, etc. did not influence enjoyment of the thinking period. Study 10 was held in the laboratory, and participants were asked to engage themselves with their thoughts. This time, however, subjects could receive negative stimulation (an electric shock) during the thinking time if they so desired. Many participants preferred negative stimulation to no stimulation. Of the male participants, 67% (12 of 18) administered themselves more than one electric shock during the period of “just thinking”. On the contrary, only 6 out of 24 (25%) female subjects did so. Wilson et al. concluded, “[b]ut what is striking is that simply being alone with their own thoughts for 15 min was apparently so aversive that it drove many participants to self-administer an electric shock that they had earlier said they would pay to avoid” [5] (p. 76).

Recently, researchers [6] analyzed 21 experimental study reports that had originally been published between 2010 and 2015. The Wilson et al. studies were part of this large-scale replication project. Wilson et al. were among the 12 replications that showed minor deviations from the pre-registered replication protocols and a significant effect compared to the one in the original studies. Buttrick et al. [7] conducted a direct replication of Wilson et al.’s study 8 with participants from 12 sites in 11 countries. The sample in the original study by Wilson et al. consisted of American participants only. Buttrick and colleagues summarized that the average effect size of the replication was quite large, though smaller than in the original study. The overall cross-cultural outcomes of the replication showed that participants preferred to engage in everyday activities (reading or watching a video) rather than turn one’s attention inward and to think for pleasure.

Fox and colleagues [8] critically reviewed Wilson et al.’s findings. After reviewing the data, they found that most of the participants (57%) did not administer electric shocks to themselves, and only 17% did so more than twice, i.e., 83% did not shock themselves at all or they did it only once, probably out of curiosity. More importantly, there was little support for the notion that participants found the period of “just thinking” to be aversive or unpleasant. On average, subjects even rated the experience of engaging themselves with their thoughts to be somewhat enjoyable. This seems to be a classic case of how results can be interpreted differently, that is, whether the glass is half full or half empty. In summarizing the results, one could say that the response curve is normally distributed with average empirical values close to the means of the scales. Fox and colleagues suggested that the main outcome of Wilson et al.’s investigation lie in its insights regarding “mind-wandering”. They concluded, “[e]ven when it is less than enjoyable or entertaining, spending time with our own unstructured thoughts may increase our overall sense of well-being and life satisfaction” [8] (p. 4).

Jokic, Zakay, and Wittmann [9] added further insights to the topic of how people cope with being exposed to an empty time interval. In their study, 84 participants were asked to spend time alone in an empty room waiting until one of the scientists conducting the study arrived. The period of time lasted 7:30 min. Similar to Wilson et al.’s studies, the participants had to hand in their belongings (cell phone, wrist-watches, etc.). Afterwards, the subjects were requested to fill out scales assessing their states of consciousness during the empty waiting time. The findings indicated that those subjects with higher scores in relaxation and positive feelings judged that time passed faster, and they estimated the period of time to be shorter than it actually was. Conversely, when individuals felt more irritated while waiting, they over-estimated the time duration. Importantly, in this study, individual differences in impulsiveness, which accounted for the variations in the responses were

controlled for. Individuals who are more impulsive and present oriented are less relaxed while waiting, and overestimate the waiting time. This relationship between personality traits (time orientation) and time perception was also found in a study where participants had to wait for five minutes in a resting-state and were measured with a physiological recording. Afterwards they were requested to judge the duration of the resting period [10]. More impulsively present-oriented individuals overestimated the time duration.

An affective reaction to an “empty period of time” or silence was further revealed through research by Pfeifer, Sarikaya, and Wittmann [11], who found that 6:30 min of silence preceded by a session of Depth Relaxation Music Therapy (DRMT)/Hypno Music Therapy (HMT) lasting 16 min showed significant effects in increasing relaxation, and decreasing future orientation, the sense of space, and the sense of time in participants ( $n = 60$ ). These findings support the idea that a period of silence during which participants occupy themselves with their own thoughts can increase relaxation and be enjoyable rather than unpleasant or aversive if conducted in a certain way, i.e., in the context of depth relaxation induction.

This is what health insurance companies also recognize and emphasize. Surholt [12] maintains that a silent state and just doing nothing can create a period of relaxation. If the circumstances are adequate, the level of stress and blood pressure can even decrease. The problem is that nowadays, most people have little experience of silence and quietness. This concurs with Wilson et al.’s study.

A simple 90 min walk in a natural setting without any distractions also seems to have relaxing effects on the brain. Bratman and colleagues [13] proved that a 90 min walk in nature decreases rumination and neural activity in the subgenual prefrontal cortex (sgPFC), whereas a walk of the same duration in an urban setting does not.

The idea of silence, Depth Relaxation Music Therapy (DRMT)/Hypno Music Therapy (HMT), and walking in nature is that spending time with one’s own thoughts can increase relaxation and enjoyment and have specific health-fostering effects. However, in other contexts, the effects may be different as Killingsworth and Gilbert [14] concluded that “a human mind is a wandering mind, and a wandering mind is an unhappy mind” (p. 932). They found correlations between negative moods, mind-wandering, and unhappiness.

Research regarding silence, or doing nothing but engaging oneself with one’s own thoughts could add further knowledge to this field. The present study is strongly focused on such an “empty” or “silent” period of time “just thinking” and explores how participants experienced and judged a silent time lasting 6:30 min.

This was a variation of the principle study designed by Wilson et al. [5], where people were asked to “think” while waiting. We added state inventories of the conscious dimensions of time, space, and self, which have been shown to be sensitive in a real waiting situation [9]. Time is an essential experience that, surprisingly, was not assessed in the study by Wilson et al. [5]. We added trait questionnaires that were sensitive for differences in the empty waiting situation to assess individual differences in impulsivity and time orientation during the “thinking” situation [9].

## 2. Methods

### 2.1. State Scales on Subjective Time, Self, Space

The inventory on subjective time, self, space (STSS) retrospectively assesses the following experiences during a given period of time with non-verbal pictorial scales containing answer categories ranging from 0 to 6: (a) Awareness of the bodily self, and awareness of the surrounding space. The questions are: “How intensively did you experience yourself?” and “How intensively did you experience the surrounding space?” Higher scores indicate greater awareness of body and space; (b) Two 100 mm visual analogue scales (VAS) were presented with the following questions: “How intensively were you aware of time?” (Anchor points: not at all—extremely aware), “How fast did time pass for you?” (Anchor points: Extremely slowly—extremely fast). (c) Participants were asked to indicate the amount of time they were oriented towards the past, present, and future. A 100mm line had to be subdivided into three parts (with two vertical marks) representing the past, present,

and future. (d) Participants were finally asked to indicate how long they thought the experience had lasted in units of clock time. These scales have been shown to be sensitive to changes in silence after Depth Relaxation Music Therapy [11] and suitable for assessing a real waiting-time situation [9]. They have also proven sensitive to differences in the assessment of experience during a dance performance at two different speeds [15].

## 2.2. State Scales (VAS) on Relaxation and Boredom

Two further VASs asked about the period of silence: “How relaxed do you feel now?” (Anchor points: not at all relaxed—extremely relaxed), and “How much did you feel boredom during the session?” (Anchor points: no boredom at all—extreme boredom). The VAS on relaxation was assessed twice, once before and once after the period of silence.

## 2.3. State Scales Measuring Self-Assessed Emotional Reactions

The emotional reactions that participants felt most of the time during the 6:30 min were assessed with a non-verbal, pictorial assessment technique, the Self-Assessment-Manikin (SAM) scale, which directly measures subjective responses including (a) positive vs. negative valence, and (b) an individual’s arousal level [16]. We used the five-point version of the scale. The two SAM scales were assessed before and after the period of silence.

## 2.4. Trait Scales on Time Perspective and Impulsivity

The Zimbardo Time Perspective inventory (ZTPI) [17] consists of 56 items ranging from 1 (very untrue) to 5 (very true). Items are grouped into five subscales representing different aspects of past, present, and future orientation as follows: past-negative (“I often think about the bad things that have happened to me in the past.”); past-positive (“Happy memories of good times spring readily to mind.”); present-hedonistic (“I take risks to put excitement in my life.”); present-fatalistic (“Because things always change, one cannot foresee the future.”); and future (“I am able to resist temptations when I know that there is work to be done.”).

The Barratt Impulsiveness Scale (BIS-11) [18] consists of 30 items ranging from 1 (rarely/never) to 4 (almost always/always). Items are grouped into three subscales: non-planning impulsivity, motor impulsivity, and attention/cognition impulsivity. We used the calculated sum score as an overall measure of self-rated impulsivity.

## 2.5. Participants

Sixty-seven students participated in our study. Three had to be excluded from the analysis for reasons such as incomplete measuring instruments or an organizational error (the regular study room was not available for our study purposes because of a double occupancy). Therefore, the final sample consisted of 64 complete data sets. Of these 64 participants (51 women and 14 men), 47 were students in the BA program “Inclusive Education”, 5 in the BA program “Social Work/Social Education”, 7 in the BA program “Education”, and 5 in other BA or MA programs at the Catholic University of Applied Sciences in Freiburg. The mean age was 26.7 years (S.D. 6.9, range: 19–52). Participants were either recruited through brief information events presented by the researchers in lectures, word of mouth, informative material on the university’s website/intranet, mail distribution, or personal approach and invitation. When students signed in for participation, they received the necessary information (number of the seminar room at the university where the study took place), and an individual appointment was arranged. As stated in the informed consent that participants signed, the overall study procedure was conducted under voluntary criteria, i.e., students could decide whether they wanted to take part in the study, and they were also free to drop out at any phase of the process if they so desired. The scientific and value-oriented principles outlined by the Catholic University of Applied Sciences in Freiburg served as a fundamental ethical frame of reference for our study [19]. The study was performed according to the ethical principles of the Declaration of Helsinki.

## 2.6. Study Interventions

The study intervention sessions were conducted in a seminar room at the Catholic University of Applied Sciences in Freiburg (see Figure 1). The room was chosen due to its neutral character. In other words, we used a room with very plain interiors to avoid any irritation or sensation. There were no plants, posters, photographs, or paintings on the walls—just plain white walls. The seats and the table were of rustic appearance (with no pillows or varying colors). Study participants were asked to seat themselves with their back to the window. The subjects' view was directed towards the door (see Figure 2). At the very beginning of the session, the researcher provided each participant with relevant information about the procedure, the study aims, and how to fill out the questionnaires and forms. In addition, each participant received an informed consent listing the study objectives ("This study focuses on the subjective experience and perception of a session of silence alone in a room.") and procedure: (1) Filling out questionnaires; (2) Period of silence; (3) Filling out questionnaires. The researcher provided enough time for the participants to carefully read through the information sheet and asked if there were any outstanding issues that needed to be clarified. Participants were informed that they could quit the study at any stage of the procedure without mentioning any reasons. Finally, they were asked to sign the consent form. Similar to Wilson et al.'s [5] procedure, subjects were asked to hand over all their belongings (backpacks, writing implements, cell phones, tablets, laptops, etc.). These were stored safely before the participants filled out the questionnaires. Afterwards, participants were asked to spend a period of silent time on their own. The exact wording was: "Please spend the following time occupying yourself with your own thoughts and please stay seated and awake." The period of silence lasted 6:30 min, but was of unknown duration to the subjects. Each participant spent these 6:30 min of silence alone in the room. The researcher left the room prior to the period of silence. Following the 6:30 min of silent "just thinking", the researcher returned and asked the participant to fill out the scales. For detailed information regarding the outline of the intervention session, see Table 1.



**Figure 1.** The seminar room at the university that the intervention sessions were held in.



**Figure 2.** The subjects' view was directed towards the door of the seminar room that the intervention sessions were held in.

**Table 1.** Outline of the intervention sessions.

1. General introduction of study aims	5 min.
2. Filling out the two trait questionnaires (ZTPI <sup>a</sup> , BIS <sup>b</sup> ), SAM <sup>c</sup> , and level of relaxation	10 min.
3. Period of silence	6:30 min.
4. Filling out of STSS <sup>d</sup> , SAM <sup>c</sup> , level of relaxation and boredom	5 min.
Total of 26:30 min.	

*Note.* Steps 1 to 4 were conducted in a room at the Catholic University of Applied Sciences Freiburg;

<sup>a</sup> ZTPI: Zimbardo Time Perspective Inventory; <sup>b</sup> BIS: Barratt Impulsivity Scale; <sup>c</sup> SAM: Self-Assessment-Manikin; <sup>d</sup> STSS: Inventory on Subjective Time, Self, Space.

### 3. Results

We tested whether there were significant differences in relaxation (VAS), as well as emotional valence and emotional arousal (SAM) after as compared to before the silent “thinking” experience. The question was how the 6:30 min period of silence would influence these affective states. Participants were significantly ( $t = -7.3, p < 0.0001$ ) more relaxed after (76.5) vs. before (57.3) the period of silent time. They also felt significantly better after (1.12) (SAM valence range: -2 to 2;  $t = -3.0, p = 0.004$ ) than before (0.92) the period of silence, and they were significantly less aroused (SAM arousal range: 0 to 4;  $t = 7.3, p < 0.001$ ) after (1.86) as compared to before (2.6). The period of silence was experienced as relaxing and improved the participants' mood.

The following presents a descriptive evaluation of the subjective measures of the states of consciousness during 6:30 min of silence (Table 2). The intensity of the sense of self was 4.97 average, above the mean of the item range (3.5; item range: 0–6); and the intensity of the sense of space averaged 3.14, just below the mean of the item range. The intensity of the sense of time, with an average value of 32.06 was definitely below the mean (50, item range 0–100). The felt passage of time, with a value of 77.05 was in the upper half of the item range. Regarding the three time orientations, the feeling of presence (53.06) was more dominant than past (19.61) or future orientation (27.33). The duration of silence was judged relatively accurately at 7.09 min with small deviation (S.D. 2.92), but had an overall range between 3 and 20 min. The feeling of boredom was very low with an average value of 10.39 and a maximum value of 61. On average, individuals confined to the period of silence felt the self quite intensively; they perceived the surrounding space with an average intensity; generally, time was not felt very intensively; the subjective speed of the passage of time was fast;

subjects were on average quite in the present moment; the duration was judged accurately; and boredom was hardly felt.

**Table 2.** Subjective measures for states of consciousness during 6:30 min of silence. The columns list the individual variables for the STSS and the state-of-boredom scales, the respective item range, the empirical range found in our sample, arithmetic mean, and standard deviation (S.D.) across all subjects.

Variable	Item Range	Empirical Range	Mean	S.D.
Intensity Sense of self	0–6	2–6	4.97	0.92
Intensity Sense of space	0–6	0–6	3.14	1.83
Intensity Sense of time	0–100	0–89	32.06	27.33
Speed Time passage	0–100	9–100	77.05	19.21
% Sense of past	0–100	0–66	19.61	16.25
% Sense of present	0–100	0–98	53.06	24.17
% Sense of future	0–100	1–72	27.33	19.34
Felt duration [minutes] Period of silence	0–	3–20	7.09	2.92
State of boredom	0–100	0–61	10.39	13.18

No inter-correlations between state variables assessed after the thinking period were found ( $p < 0.01$ ). We attribute this to the ceiling effects. When relating individual differences in impulsivity and the five time orientations with differences in experiencing the period of silence, hardly any significant correlations ( $p < 0.01$ ) were found. Individuals who had higher values in past positive orientation were less in the present ( $r = -0.347$ ,  $p = 0.005$ ) and more future oriented ( $r = 0.321$ ,  $p = 0.01$ ).

#### 4. Discussion

In contrast to the interpretation of the study by Wilson and colleagues [5], who claimed that silent time induced an affectively negative experience for a large number of their participants, we found no such overall reaction. Note that the interpretation by Fox and colleagues [8] of Wilson et al.'s data is that participants overall did not show negative reactions, but that the distribution of responses was quite balanced. We also demonstrated that 6:30 min of silent, empty time, where individuals could only “think”, led to a significant increase in relaxation and a positive mood. Focusing on the reports from the participants on their consciousness of time, on average they did not focus very much on time, and they subjectively felt that the time passed quickly. These are typical signs of relaxation and flow [11,20,21]. Complementing these findings, the experience of boredom on average was very low, and the sense of self was comparably high. Often such a heightened sense of self is a sign of boredom and irritation combined with the feeling of a slow passage of time [15]. Here, we found that the instruction to wait and think leads to more self-awareness, but in an emotionally positive way.

Overall, our sample of students enjoyed their silent waiting time when instructed just to think. According to Fox et al. [8], the Wilson et al. [5] students showed normally distributed reactions to the scales with the empirical average lying close to the mean score of the scales. Our student sample, however, showed a skew in the direction of very positive reactions to the situation of thinking alone. This ceiling effect of people feeling very relaxed probably explains why we did not find associations with personality traits, such as impulsivity or time orientation, as found in studies with a real waiting time without the instruction to “just think” [9,10]. Interestingly, thinking as an enjoyable activity has

recently been addressed in publications under the headline of “thinking for pleasure”. Studies have shown that “thinking for pleasure” does not come easily, it may even be cognitively demanding, but can be enjoyable if conducted under the right conditions with simple cognitive aids that make it easier and more enjoyable for study participants [22,23]. In one of these studies [23], participants reported that the more they aimed to have pleasant thoughts, the more enjoyment they actually experienced. Motivation may also be an important factor. Alahmadi et al. [24] found that instructions helped participants if they were instructed or given the goal to entertain themselves with their thoughts and to enjoy such times of thinking. Motivation was the crucial catalyst for making thinking enjoyable in this case. However, in our study, participants were not given any specific goals, tasks or instructions, nor was there any other motivational support. We only asked the participants to spend a period of silent time, that was of unknown duration to them, to occupy themselves with their own thoughts alone in a room. This led to a significant decrease in arousal, a significant increase in relaxation, a positive mood and enjoyment in the study participants. Similarly, a study conducted by Nguyen et al. [25] pointed towards the effectiveness of solitude on arousal and self-regulation. A 15 min period of solitude, of being alone, sitting on a comfortable chair, in silence, helped participants to become quiet, to calm down and to regulate their affective states. The outcomes of our study can be discussed in the light of Nguyen et al.’s findings, although we relied on a silent period of time lasting 6:30 min instead of 15 min.

What makes our findings striking is that we did not tell the subjects beforehand how long the thinking interval would last. This creates a situation of temporal uncertainty, which is typically experienced as irritating [26]. If you know that a train will be delayed by 10 min, this information gives certainty, which is experienced as positive. If you do not know when the train will come, you feel more irritated. In the study by Wilson et al. [5] (Supplementary Materials there in), subjects were informed precisely or approximately about the duration of waiting (10–15 min). Nevertheless, those individuals on average felt more irritated by the thinking situation than our students did.

What might account for the differences between the Wilson et al. study [5] and our investigation? Two differences regarding the student sample can be considered. One reason could lie in the specific study subjects that the students in our study pursued at the university. A potential cultural difference might also be at work here. (1) The students in our sample studied “Education”, “Inclusive Education”, “Social Work/Social Education”, or other social and health-related BA/MA programs. It can be argued that a certain type of students chooses this type of study program. Additionally, once enrolled in the study program of the university, the curriculum emphasizes emotional self-awareness and includes lectures and seminars covering this area. Typically, these particular study programs have a majority of women enrolled and this is reflected in our sample. Further studies could assess whether women are more comfortable with waiting situations. In studies 1 to 6 in the Wilson et al. [5] article, there were 211 female, 162 male, and 40 unspecified subjects (see Supplementary Materials there in), which is more balanced than in our study sample (51 women and 14 men). (2) A second aspect one has to consider is the influence of intercultural differences, which has a strong impact on the way people manage empty time [27]. For example, it has been shown that American subjects were less likely to delay gratification in delay-discounting tasks than Japanese subjects [28]. Delay-discounting tasks assess individuals’ abilities to imagine living through a waiting time before receiving a reward. Japanese subjects were more self-controlled and considered themselves more capable of waiting for the delayed reward. Although speculative in our context, it is possible that students from the U.S.A. feel worse during an empty time interval than German students. This is a topic for further investigation, especially since current cross-cultural investigations, conducted in 11 countries, indicate that across cultures “thinking for pleasure” is judged as being significantly less enjoyable than being engaged in an external activity [7,23]. In our study, there were cross-cultural differences in judging the period of “just thinking”, which were explainable through variations in individual differences. One such cross-cultural difference was “experience with meditation”. This brings us back to our specific subgroup, students of “Social Work/Social Education”, who through their curricula are exposed to techniques of mindful concentration, which might explain the high levels of positive affect and relaxation in our study group.



## 5. Limitations

Spending 6:30 min of silence alone in a room “just thinking” or engaging oneself with one’s own thoughts does not mean that there was “absolute” or “total” silence. The room in which our intervention sessions were carried out was chosen due to its plainness to avoid as many affecting stimuli as possible. Nevertheless, such a room cannot guarantee absolute silence under laboratory conditions. Even if it is “silent” as far as outer conditions or sources are concerned, there are inner sounds that provoke our attention. “Experiments have shown that even if deprived of sound sources and in a sealed, silent environment, we become aware of sounds and sensations from inside our bodies” [29] (p. 550).

## 6. Conclusions

Contrary to earlier findings [5], our study participants felt comfortable while waiting during an empty time period of 6:30 min when they were instructed to just think. Waiting without distraction for such a period of time is not a negative situation per se as has been suggested before. For some individuals—in our sample, the majority—it can be a pleasant and relaxing experience.

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