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Running away from the marshmallow: the relevance of behaviour settings for a situated science of self-control

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The behaviour settings approach was introduced as a means to study the variability of human beings’ behaviour outside the lab. More recently, it has been argued that it also provides a fruitful avenue for developing situated accounts of cognition. This article will provide a proof of concept for the latter suggestion, focusing on the science of self-control. Self-control is the ability of individuals to pursue goals they value in the face of conflicting motivations. The hypothesis we bring forward is that this ability should be understood as a set of skills by which individuals modulate their relation to their environment, more specifically the behaviour settings they inhabit. With this conception of self-control in hand, we will take a critical look at well-known experiments involving delayed gratification tasks and propose concrete suggestions on how to improve them. This will bring us to the conclusion that the behaviour settings framework might have a valuable role to play in developing a situated science of self-control.

This article is part of the theme issue ‘People, places, things and communities: expanding behaviour settings theory in the twenty-first century’.

1. Introduction

The notion of behaviour setting first appeared in the works of psychologist Roger Barker [1–4]. Coming from a behaviourist background, Barker and his collaborators sought to establish laws that could explain various structural aspects of human behaviour, such as its variability, frequency and distribution. After months of observing a large group of children living in Oskaloosa, a small town in Kansas (United States), the researchers made a significant observation: children’s behaviour could be more accurately predicted by considering the specific location in which the behaviour occurred (i.e. the drugstore, the classroom, the basketball field, etc.). Building on this insight, the psychologists formulated the bold hypothesis that the structure of human behaviour is intrinsically linked to the structure of the environment in which it unfolds. Barker and colleagues coined the term ‘behaviour setting’ to refer to these environmental structures and created what they called ‘eco-behavioural science’, a scientific endeavour devoted to analyzing how human behaviour gets structured by the characteristics of the socio-environmental context where it takes place.¹

¹This movement roughly coincided with the rise of the person–situation debate, a closely related controversy in psychology regarding the question whether personality factors or situational factors are more important for explaining behavior. Paradoxically, one of the core figures in the situationist side of that debate [5] also developed the marshmallow test for self-control, which we will argue here did not sufficiently take the role of the situation into account.

The notion of behaviour setting, which had largely faded from scholarly attention for decades, is now experiencing an interesting revival. This resurgence is closely intertwined with the rise and establishment of what are commonly termed ‘situated’ theories of cognition [6]. In short, these theories—often referred to as ‘4E’ theories, an acronym that stands for ‘Embodied’, ‘Embedded’, ‘Extended’ and ‘Enactive’—defend that cognition transcends mere brain activity, and that a proper understanding of (most types of) cognitive activity requires thinking of it as spanning the whole body and the environment. In this context, a group of researchers [7–10] have defended the behaviour-setting paradigm as a promising framework for investigating cognitive activity as an inherently situated phenomenon. The driving hypothesis posits that in order to explain many types of cognitive activity we need to take the environmental properties that constitute a behaviour setting into account.

In this article, we aim to develop a concrete example showing how the behaviour settings framework offers a valuable theoretical and methodological toolkit for investigating the situatedness of cognition. As a case study, we will focus on the cognitive activity of self-control. Our main goal in this article will be to examine how the behaviour settings framework can be employed for studying self-control as a situated phenomenon. This article is structured as follows. In §2, we will describe in what sense we take self-control to be a situated phenomenon, and outline our proposed account of self-control as a set of situated skills. In §3, we provide a brief overview of the state of the art of the science of self-control. We will summarize well-known objections against certain traditional empirical paradigms used for studying self-control, most notably delayed gratification tasks. However, we will argue that there is a more fundamental issue underlying these objections: delayed gratification tasks are hardly representative of the scope of self-control challenges people struggle with in everyday life. We will argue that the behaviour settings framework can provide theoretical and methodological tools for addressing these shortcomings. In §4, we will show how the behaviour settings framework can theoretically explain how self-control skills are upheld and partly constituted by concrete environments, and how the methods used in behaviour settings research can be used to empirically study these situated skills. In the final section, we will develop several concrete proposals for empirical paradigms studying self-control on the basis of the behaviour settings framework.

2. Situated self-control: an overview of the proposal

Self-control is generally defined as the ability of individuals to pursue goals they value in the face of conflicting motivations [11–13]. This definition is intentionally broad: it aims to cover not only standard cases of battling short-term temptations, such as resisting the impulse of buying in order to save money for a house, or resisting nice foods in order to stay healthy. Instead, self-control is the more general ability to realize goals and values that are judged as important *by the agent herself*, in situations where the agent experiences *any* kind of motivational obstacle [14]. This leaves room for many kinds of motivational conflicts, including cases in which an agent might deliberately prefer to realize short-term goals by resisting long-term considerations (for example, because the future has become very uncertain), or cases where individuals try to overcome not temptation but apathy [15,16].

The question how individuals exercise self-control is central for philosophers and psychologists alike. Most accounts in the literature attempt to answer it in terms of cognitive mechanisms, with special interest in the question how such mechanisms could potentially also be studied on the level of brain processes. Some authors take the relevant mechanisms to be motivational [5,13,17]. In these accounts, the role of self-control mechanisms is to boost the motivational power of an agent’s goals and/or reduce the motivational power of temptation. Other authors take self-control to involve volitional mechanisms blocking the effect of temptations [18–20]. Such accounts attempt to identify willpower mechanisms and examine how these would interact with motivation, both on the cognitive and the neural level [19,21,22]. A famous example of this second approach is Baumeister’s notion of willpower as a ‘mental muscle’ that needs to be exercised and gets depleted with use [23,24].

This common assumption, i.e. that the question how we exercise self-control should be answered in terms of designated self-control mechanisms that are realized in the brain, is being challenged from the perspective of situated cognition [25–28]. The main message brought forward in these contributions is that to understand how self-control works, we need to look beyond the ‘mind-brain’ of individuals,² as both the rest of the body and the physical and social environments of individuals play a crucial role in bringing about self-control.

Even though we fully agree with this message, we believe that, as is, it defends only a very general and therefore not very informative claim. Merely stating that the body and the environment play a crucial role in explaining self-control does not specify the exact role of these situated factors. Instead, we want to propose the more radical claim that self-control cannot be explained in a strictly internalist fashion. More specifically, we claim that self-control should be understood as a quite general ability that can only be meaningfully ascribed to persons-in-context, and not to specific mechanisms happening inside their brains. One argument for this is conceptual: self-control is *defined* as a struggle *by individuals* who experience both valued goals and tempting motivations, and who take steps to resolve this struggle by deploying various skills (for more extensive arguments for this claim, see [29–31]). A second, empirical argument (which we will further develop in this article) is that both the values agents judge as important and the strategies they employ to resist temptations, depend critically on their relationship to the particular behaviour settings they inhabit [10].

By advancing this view, we commit to what Sripada [19] has labelled a ‘results’ account of self-control. Against ‘process’ views of self-control, which assume that only some cognitive processes count as self-control processes, we call an individual’s

²Obviously, different authors have very different views on the relation between mind and brain, and talking about ‘mental processes’ does not commit one to the claim that mental processes can be explained in terms of brain processes, or even that the mind is realized by the brain (after all, extended mind theorists talk about mental processes too and they clearly do not commit to either claim). However, most authors defending motivational or willpower accounts of self-control do seem to commit at least to the claim that self-control can be explained in terms of mental processes which are realized by brain processes.

activity an exercise of self-control in so far as the agent thereby pursues goals they value in the face of conflicting motivations. In consonance with this view, we propose to understand self-control as a *set of skills* (for other skill accounts, see [32,33]). These skills can vary in kind, depending on the specific self-control problem at hand and the context in which the individual finds herself, which implies that being skilled at self-control requires knowing what strategies would work best in a specific context, and knowing how to employ them (in recent social-psychological literature this is referred to as ‘polyregulation’ [14,34]). For example, someone wanting to quit smoking might engage in different strategies for reaching her goal. She might gradually reduce the number of cigarettes smoked in a day, or build a routine of going to the office without taking her cigarettes with her. To give another example: someone aiming to reduce procrastination could use a variety of tricks and tools—she might try to get into the habit of doing the most urgent task first thing in the morning, or for instance hire an assistant to do certain tasks for her.

So, in what sense is our conceptualization of self-control as a set of skills, a *situated* approach to self-control? As the previous examples already made clear, we believe the environment plays a crucial role in enabling skilled performance. Self-control is not a capacity we realize on our own. Instead, many self-control strategies can be seen as ways in which individuals modulate their physical and social environments: they reorganize their surroundings, remove temptations and involve others to remind and support them in their pursuit of a goal [26,34]. More importantly, we believe this applies to skilled performance in general: the notion of skill seems inherently relational. Calling someone skilled indicates that he or she manages to act on, and respond to, their surroundings in an intelligent way, that is, that ‘one has learned to use one’s judgment to modify one’s performance according to the demands of the specific situation’ [35].

In this sense, our approach differs from other skill accounts of self-control like Levy [36] or Mylopoulos & Pacherie [33]. While these authors also claim that self-control involves the use of a variety of different skills and strategies (some of which involve making use of the environment), they do not consider the notion of skill to be inherently situated as we do (in fact they mostly focus on cognitive strategies like using one’s imagination or shifting attention). We are indebted to the situated analysis of skills brought forth by Baggs *et al.* [37]. In their paper on skill learning, they emphasize that ‘the appropriate unit of analysis for understanding skill learning is not the body itself, but the activity that spans organism and environment’ (p. 2). Echoing these views, we claim that exercising self-control is a dynamic and interactive activity: it involves agents recruiting and modulating their relation to different aspects of their environment. Moreover, Baggs *et al.* argue that agents learn skills by establishing ‘enabling constraints’ in their surroundings. By doing so, they actively limit their degrees of freedom in order to make it easier to realize the task they set themselves. For example, a child learning to walk might lean on a chair for support: whereas at first, this *limits* their freedom of movement, it enables them to gain control over the various muscles and joints needed for walking. Thus,

[i]t makes little sense to say that the child acquires a skill, or possesses it [...]. Instead, it is more useful to understand skill learning as a re-organization of the entire extended system constituted by the actor, its environment, and the relational structure connecting the two. Skill learning is the establishing of enabling constraints at the scale of the task. ([37, p. 6]).

Even if our focus is not on skill learning *per se*, we believe this analysis of skilled performance as inherently situated can be fruitfully applied to the understanding of self-control. Individuals who are pursuing a goal in the face of conflicting motivation might try out a variety of different strategies, many of which could be seen as establishing enabling constraints in their environment. Removing temptations limits one’s choices, but this makes it easier to reach one’s goal. Similarly, asking for support from others (for example, by asking them to monitor one’s commitment) also frequently enables goal realization by limiting one’s options.

Here, it is important to point out that access to self-control strategies is often unfairly distributed owing to barriers in the social environment that disadvantage certain groups of people (for example, people suffering from ADHD). As Koi [38] emphasizes, for an agent to have access to self-control strategies, it is necessary that they have the appropriate means to do so, are aware of these means and can exercise them without excessive effort. Koi’s analysis points to the importance of removing social barriers to self-control. This opens up a series of important questions: what are these barriers? What behaviours are they impeding? What are the most effective and available behaviours to (certain kinds of) individuals? Our framing of self-control as a set of situated skills sets the stage for exactly such an investigation by allowing us to observe and analyze how agents, in their day-to-day lives, actively interact with their environment in order to learn and exercise self-control skills; in other words, we aim here to add to Koi’s discourse by preparing the grounds for a situated science of self-control.

The crucial point is that if self-control is a situated capacity in the sense described above, answering the question how individuals exercise self-control requires us to investigate *individuals in their context*. This contrasts sharply with approaches that understand self-control in terms of intracranial processes or mechanisms. On such approaches, it might in principle be possible to determine how self-control works just by doing cognitive neuroscience and studying fMRI scans. In our view, even if the brain obviously plays a crucial role in bringing about self-controlled action, it is misguided to try to understand what self-control is by searching for specific mechanisms as realized in the brain.³ So far, we have only proposed a situated conceptualization of self-control (and then merely a tentative sketch which would require much more elaboration). However, we are interested in the implications that our conceptualization might have for the science of self-control. In §3, we will provide a very brief overview of the main paradigms used in the scientific investigation of self-control and discuss some objections raised against them from a situated point of view.

³To be clear, this leaves open the possibility that certain more general mechanisms realized in the brain (for example, attention or response inhibition mechanisms) have a role to play in certain ways of exercising self-control skills.

3. The science of self-control

As stated earlier, traditional approaches to self-control understand it to be realized by dedicated motivational or volitional mechanisms, which are probably realized by brain processes. This approach entails that, in principle, one might be able to isolate and measure such mechanisms, either through psychological tasks and/or through neuroscientific investigation. Although we have already clarified our commitment to a situated framework, it is worth spending a few words discussing these traditional scientific frameworks. To do so, we will focus on one of the most influential examples: the marshmallow test.

In Mischel's delayed gratification tasks, children were offered a marshmallow and had the chance to earn a second one if they waited a short amount of time (usually around 10 min) before eating the first one [5,39,40]. The test was designed to measure the ability of children to engage in (future-oriented) self-control: the more a child waits the better they are in exercising self-control. Importantly, a relevant number of the subjects that participated in the original studies in the 1960s and 1970s were followed in their lives for 40 years [41]. These subsequent longitudinal studies seemed to confirm the original hypothesis, i.e. that longer waiting times signalled a higher ability to exercise self-control, as they showed that children who waited longer did better in school and university, got better jobs and fared better in life in general.

The most important thing to note, however, is that Mischel and colleagues understand self-control as the triumph of 'cold' cognitive mechanisms. These cold mechanisms (associated with the activity of the prefrontal cortex (PFC)) make it possible that an initially 'hot', tempting stimulus is re-conceived or re-appraised as something not so desirable considering future consequences (e.g. future gratification). From this, Mischel [40] concludes that: '[t]he power resides in the prefrontal cortex, which, if activated, allows almost endless ways of cooling hot, tempting stimuli by changing how they are appraised' (p. 35), and further that '[s]elf-control activity is rooted in the PFC' (p. 44). Crucially, even though Mischel agrees that we can improve our capacity to control ourselves by training our cognitive re-appraisal strategies so that they become automatic and override the activation of the 'hot system', he is very clear that we can understand and predict an individual's self-control capacities by measuring the activity of the PFC very early in life.

In discussions surrounding self-control, Mischel's studies are omnipresent. However, there has recently been discussion regarding how generalizable they are. Most strikingly, it was noted by Watts *et al.* [42] that the subjects that participated in the early studies were children of people working at Stanford, thus forming a quite unique and privileged group. Moreover, only a small number of them, less than 50, were followed in the most recent longitudinal studies, and results were not tested against confounding factors, such as the children's background, cognitive ability and home environment. Watts *et al.* thus replicated the test, using a larger and more diverse group of children, adjusting for confounding factors, and checking whether test results had predictive value regarding the subjects' lives at 15 years of age. They found that the results of the original studies did not replicate when control variables were included.

This critique highlights the importance of including the context in which the subjects are situated in order to properly assess what kind of factors have had an influence in the course of their lives [43,44]. Failing to do so, Mischel and colleagues reached conclusions that do not easily generalize. We appreciate this recognition and want to expand on the further ways in which scientific research can more fully appreciate the situatedness of self-control; to do so, we contend, we should take the idea of context seriously. Indeed, we believe, it is not only Mischel's longitudinal studies that can gain from this, as we will now explain.

To what extent does the marshmallow test account for the individual's context in general? In the test, children do hold the goal to gain a second marshmallow and must resist the urge to eat the first one. They are probably familiar with the kind of temptation at play, i.e. wanting to get a reward now, despite a larger reward being promised in the future. However, these subjects are sitting in laboratory rooms, receiving instructions from experimenters, and provided with a very limited set of options other than staring at the marshmallow (for a similar observation, see [36]). Moreover, it is not obvious that children's behaviour in this context easily translates to what they do in their everyday lives. It is safe to assume that, e.g. had such a situation happened in their home, they would have left the room and/or found some other activity to let the time pass. Furthermore, in a 'real' context, children might be more or less motivated to engage in self-control, given a range of all other contextual factors at play (maybe they are in a rush to go play with a friend so that the preferred response is to eat the first marshmallow and leave). This leads us to believe that the marshmallow test is quite abstract compared with day-to-day situations. By this we mean that, because of the assumption that what really explains self-control are mechanisms in the brain, these studies take the individual context to be superfluous and something we can abstract from. Instead, we believe that the relevance of context in self-control should be recognized in scientific research and, more recently, this has been recognized by some in the literature.

For example, a couple of studies investigated cultural differences in delayed gratification task. Lamm *et al.* [45] have found variation in strategies between German middle-class children and Nso Cameroonian children: while German children enacted many motor strategies (e.g. turning around so as to not face the temptation, walking around the room or even leaving the room), Nso children engaged in little motor activity if at all. This, according to the authors, reflects the different cultural frameworks in which the children grew up: German children feel a conflict between their powerlessness in waiting and their self-perception of a free individual; Nso children are strongly educated from a young age to follow demands within a hierarchical structure, to the point that they do not even seem to experience a motivational conflict at all.

Similarly, Yanaoka *et al.* [46] found that Japanese children, in contrast to American children, had no issues with waiting for a second marshmallow, but struggled with waiting to open a gift. According to them, this study shows how 'delaying of gratification is supported by habits of waiting for rewards accumulated in an everyday context, not simply reflecting higher level processes that override temptations' (p. 1178). Indeed, there is a stronger emphasis in Japanese culture to wait for food, and a stronger emphasis in American culture to, before opening a gift, wait for the person who gifted it. Most strikingly, had Japanese children participated in Mischel's original marshmallow test, experimenters would have wrongly concluded that

Japanese children are much better than American children in self-control, but this conclusion would be motivated by the assumption that we can investigate self-control without considering the cultural specificities of the subjects involved.

Regarding self-control in general, Duckworth *et al.* [47] have also begun to include the individual's context in their study of self-control. They have developed what they call a process model of self-control, which highlights the different strategies one can use to regulate an impulse depending at what stage of its generation they are acting upon. They stress that the most effective strategies are the ones that act the earliest, which include situation selection and situation modification: that is, changing one's environment to remove the temptation or preselecting one to avoid it completely leaves one better off than resisting the impulse once it has appeared.

This brings us to the suggestion that the behaviour settings framework might have something to offer here. In order to understand how agents pursue goals that are important for them in their everyday lives while also experiencing motivations that point in conflicting directions, we need to observe agents in the contexts in which they experience and learn to deal with these struggles. As we will show in §4, the behaviour settings framework was developed to do exactly that.

4. Self-control in behaviour settings

Coming from a behaviourist background, Roger Barker and his colleagues were interested in formulating laws that could account for the structural properties they observed in the children's goal-oriented activities (variability, durability, distribution, frequency, etc.). However, instead of bringing the children into a controlled laboratory for observation and study, they decided to observe them in their daily life. Their aim was to ensure that the collected data closely mirrored real-world circumstances, emphasizing ecological validity. They aptly termed this endeavour 'eco-behavioural science.'

After testing different hypotheses, Barker and his colleagues came to the following realization:

We found that we could predict many aspects of children's behavior more adequately from knowledge of the behavior characteristics of the drugstores, arithmetic classes, and basketball games that they inhabited than from knowledge of the behavior tendencies of the particular children. ([2, p. 42]).

Consequently, the researchers redirected their focus from the individual characteristics of children to the properties of these specific places and coined the term 'behaviour setting'. A behaviour setting consists of a naturally occurring group of standing patterns of behaviour that manifests at a particular place (say, a church, a grocery store, a classroom and so on) to which they have a complementary or 'synomorphic' relationship [2, p. 27].

Importantly, the notion of behaviour setting extends beyond merely describing the location (or the 'milieu') in which specific behaviours occur to denote the relationship that exists between the interdependent actions of individuals and the places where they unfold. Places are chosen, and sometimes engineered, so that they promote specific patterns of behaviour (those that are characteristic of the behaviour setting). Likewise, an individual does not enter into a behaviour setting as they enter an enclosure but rather '*joins a behavior setting as a participant and in doing so contributes to its ongoing functioning*' ([8 p. 109], emphasis original). This means that behaviour settings have a normative dimension to which individuals adapt, at least on most occasions [10,48]. This normative dimension becomes highly visible when children start correcting (or are corrected by) others, but it manifests too in the configuration of the location itself—some places are associated with authority and are thus reserved for those who act as authority figures (the teacher, the priest, etc.).

Taking this into account, we can understand behaviour settings as imposing enabling constraints, following the suggestion of Raja & Heras-Escribano [48]. Properly inhabiting a behaviour setting entails, among other things, that the individual's actions and thoughts harmonize with the dynamics already in place. The individual starts behaving as she is supposed to, restricting her degrees of freedom so that her actions are appropriate and she is recognized as a valid member of the community. However, this restriction is 'enabling': by reducing the degrees of freedom of her own actions, the individual can achieve certain goals that depend on a community working and acting together (doing groceries, playing football and so on). Behaviour settings thus enable the achievement of goals of individuals by reducing their degrees of freedom.

This last point is also connected to an aspect of behaviour settings highlighted by Heft [49]. According to Heft, by joining and participating in behaviour settings, we acquire crucial cognitive skills that make us functioning individuals in our communities: for example, we learn how to do math, how to tell stories and even how to give reasons for our actions and explain the actions of others [10,50], all of this according to the customs and practices dominant in our communities. Following these suggestions, we propose that behaviour settings might have a crucial role to play in understanding self-control as a situated set of extended skills.

To begin with, concrete exercises of self-control occur in concrete physical spaces. However, as we have seen, these are not simple locations or enclosures. Instead, they are often saturated with social practices and norms, and as such they play a role in how we exercise self-control. Behaviour settings offer resources and afford particular actions, but they also make some actions inadequate or even impossible. This means that the strategies we employ to control ourselves—say, to avoid smoking—can be partially constrained by the properties of the behaviour setting. As we see it, most instances of self-control require that we change our relation to the milieu, so that we recruit and exploit different environmental factors. For instance, a student who struggles to focus on her work at home, there being too many distractions and possibilities for procrastination, might fare better studying in a library, where the constraints on their behaviour will favour concentration and motivation to work.

This realization has interesting implications for how we analyze the science of self-control. As we mentioned before, one possible line of critique of Mischel's marshmallow test has to do with the physical context in which the experiment takes place. Children are kept in a room and deprived of all sorts of distractions, except those they can create by themselves (e.g. stories they make up, songs they sing to shift their attention from the marshmallow, etc.). Given that Mischel's lab is a behaviour setting with a very limited range of affordances, it is not surprising that most children would come up with strategies that fall under what he calls 'cognitive re-appraisal'. The question, however, is: had we given the kids a richer behaviour setting with more behavioural options (including the possibility of leaving the room), would we find the same results? Would most children entertain cognitive reappraisal strategies if they had other options? This question is important because it touches upon the main conclusions defended by Mischel [40]—viz., that self-control is primarily the result of cognitive reappraisal and 'resides in the PFC' (pp. 35, 44).

5. A situated science of self-control

In this final section of the article, we want to develop some concrete suggestions on how the behaviour settings framework could be used for studying self-control as situated skilled performance. As we see it, the behaviour settings framework offers three important methodological tools: (i) methods for 'ecological' behavioural observation, (ii) methods for studying particular individuals ($n = 1$ designs), and (iii) methods for studying phenomena over longer time scales.

With respect to the first point, the behaviour settings framework developed a method of systematic observation of the participants' doings and sayings in specific settings, which were subsequently analyzed and categorized along various dimensions. For self-control research, this opens up the possibility of developing eco-behavioural observational studies of individuals who for example experience specific self-control-related struggles. To focus the investigation, it would be important to select behaviour settings that have specific relevance for self-control-related phenomena. For example, one could observe people's actions in settings like railway stations or shopping malls, settings that are thought to steer people towards impulsive consumer behaviour. Another possibility would be to focus on settings that are specifically geared towards recovery from addiction (such as AA meetings or clinical settings). This raises the question: how is it possible to observe self-control 'from the outside', given that we defined it as a partially subjective phenomenon (in the sense that it involves an individual experiencing goal commitment and motivational conflict)? Our answer is twofold: firstly, even if the behaviour settings framework is primarily geared towards studying *behaviour*, the fact that 'what people say' is taken to be part of their behaviour already offers a wealth of information about individuals' subjective perspectives. And secondly, we believe that observation should be combined with self-report and possibly also other-report measures, which can provide crucial information on the individual's goals and motivations. In our view, this fits a truly situated approach: because self-control is an ability of a person-in-context, studying this empirically requires integrative methods that measure both person-level features and contextual features and bring these features together.

Following this line of thought, it has been suggested that observation methods as used in behaviour settings could be fruitfully integrated with critical qualitative research methods, such as qualitative interviewing and collecting narrative accounts from the participants. For instance, Georgiou & Carspecken [51] have developed interesting suggestions on how to integrate 'subjective' or interpretative methodologies with the more 'objective' forms of observation that have mostly been used in research on behaviour settings. Such an integration of qualitative, subjective methods seems particularly relevant for self-control research, as it would allow researchers to capture individuals' own perspectives on the goals that are important for them, the motivational conflicts they experience and the ways they attempt to resolve such conflicts.

This suggests a second methodological tool: a promising way to develop such integrative studies could be $n = 1$ designs, thus comparing the behaviour of specific individuals in different settings. Such a comparative approach has been an important feature of eco-behavioural science from the start. Building on this tradition, one could compare an individual's responses in 'strong' versus 'weak' situations, in other words, situations that explicitly invite specific behaviours versus situations that are ambiguous and less guiding [52].⁴ In the context of addiction, one could observe a person's behaviour in strong situations (such as a restaurant) and compare with her or his behaviour at home. As said, such observation should be accompanied by measures asking about the individual's goals and struggles, to find out how different contexts interact with these subjective features.

And thirdly, the behaviour settings approach provides specific ways to study self-control over longer timescales. As Hofmann has recently argued:

The field is lacking studies [...] over longer time frames: A better understanding of how exactly people [...] balance conflicting motivations over weeks, months, and years, perhaps in ways that may be described as more or less guided by a 'master plan' could provide additional insights into the connection between self-control and wellbeing. ([14, p. 31]).

One important exception is the work on self-control done within the context of the Dunedin Study, where self-control is investigated in a sample of participants who have been followed from birth (and who are around 50 years old in 2024). What is interesting about this study is that they also use a composite measure of self-control which integrates observation with self-report and (for children) reports by parents and teachers [53,54]. However, the conceptualization of self-control used in these studies is much more narrow, focusing mostly on features such as hyperactivity, impulsivity and lack of persistence.

⁴We are grateful to an anonymous reviewer for this suggestion.

Also, Hofmann's group and several other research groups have used experience-sampling methods for studying self-control over longer periods [14,55]. In such studies, participants at fixed times receive requests to answer questions (usually via their phone) such as whether they were currently experiencing temptation, and if so of what kind, how strong, and how they were dealing with any temptations [56,57]. These studies often have a timescale of usually 1 or 2 weeks (for example, the study by Milyavskaya sent prompts 7 times a day, for 7 days), and the data delivered by means of experience sampling are acontextual, as they are evoked by standardized prompts. We suggest that the behaviour settings approach offers a concrete framework for further developing the method of experience sampling. By focusing on specific behaviour settings in which self-control struggles play out, and by combining experience-sampling with structured ecobehavioural observation, it becomes feasible to extend the time frame to weeks, months or potentially even years, and to take contextual features into account in sampling the experiences of subjects.

Finally, and connected to the previous point, the behaviour settings framework also points out the fact that self-control strategies are not learned *in a vacuum*. As we saw before, there are interesting culture-specific differences in the means employed to solve self-control tasks, whereby these differences reflect what is considered 'appropriate behaviour' in different human communities. By conducting longitudinal studies that focus on the behaviour settings in which individuals from different communities acquire their preferred self-control strategies and values, we can draw significant comparisons across cultures, as well as advance interesting hypotheses regarding, for instance, the preeminence of one self-control strategy over others, depending on the cultural background of the experimental subjects.

To conclude, we believe that precisely the 'open' character of eco-behavioural observation makes it possible to acquire insight not only into the situational features of behaviour settings but also into participants' individual perspectives on their struggles with self-control. Also, we hold that the methods developed in the behaviour settings approach can be fruitfully used and expanded to study individual differences in how people relate to their environments in pursuing their goals, without undermining the 'situationist' spirit of the tradition. Therefore, we believe that bringing the notion of self-control into the behaviour settings perspective could increase its explanatory or predictive power.

Ethics. This work did not require ethical approval from a human subject or animal welfare committee.

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Declaration of AI use. We have not used AI-assisted technologies in creating this article.

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