# Breaking 'bad habits': a dynamical perspective on habit formation and change

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**Abstract.** Much of our daily behaviour is habitual. Habits are defined as behaviours that are performed with a minimum of cognitive effort. Habits allow for an effective use of our limited cognitive capacities. However, due to this automatising of behaviour, habits are less susceptible for change than reasoned behaviour. Especially when a habit provides positive outcomes in the present but detrimental outcomes on the long run, one can speak of a 'bad habit'. Such 'bad habits' are hard to change because cognitive information on negative outcomes will hardly affect the automatised behavioural scripts. This chapter describes the emergence of habits from a dynamical perspective. This implies that a perspective is drawn on what type of processes play a role at what stage in the development of a habit. This dynamical perspective provides indications for effective strategies to break habits.

## 1: habitual behaviour

Much of our behaviour takes the shape of repetitive actions: in the supermarket we grab our usual brand of coffee, we may follow a specific route in travelling to our work and we drink coffee in the morning. All these behaviours have in common that they are being performed with a minimum of thinking. Behaviours as such, where actions are repeatedly being performed without deliberating too much, can be grouped under the concept of habits. Habits have been demonstrated empirically to strongly determine the behaviour of people in relative stable situations, e.g. modality choice in transportation (e.g., Bamberg & Schmidt, 2003; Gärling, Fujii & Boe, 2001; Aarts & Dijksterhuis, 2000; Aarts, Verplanken & Knippenberg, 1998)

Although one may be very conscious about performing the habit, e.g., preparing coffee in the morning, the actual performance of the habit may involve very

little thinking. This is because the actual behaviour has been automatised to a large extent. Habits have large benefits for our performance in daily life: instead of thinking about routine decision problems we keep our minds free to think about issues that are not routine like (e.g., Posner & Snyder, 1975; Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977; Baumeister, Bratslavsky, Muraven & Tice, 1998). Hence, habits are mechanisms that allow us to efficiently allocate our limited cognitive capabilities. As such, the use of habits can be listed under the heading of procedural rationality, which has been coined by Simon (1976) as opposed to substantive rationality that is exclusively outcome oriented.

Habits provide a significant advantage in terms of savings on cognitive effort. This is especially functional in contexts where the decision situations hardly change, and thorough elaboration would always come up with the same decision. However, the associated lack of elaboration may also yield serious disadvantages. Basically, the use of habits causes that new information is not taken into account when performing the behaviour, nor that one is actively seeking for new information. Also small (structural) changes are often not being noticed when people behave habitually. Hence, whereas the habit may originate from a process in finding out the optimal behaviour given the prevailing circumstances, the circumstances may since then have changed such that alternative behaviour would yield better outcomes. For example, one may habitually buy the usual brand of coffee without being aware of a new brand of qualitative good eco-certificated coffee that would be preferred by the decision-maker. Also, information may have become available concerning negative outcomes of performing the habit. Even if a person is aware that the current habit is non-optimal because of such negative outcomes, this information may not affect the performance as long as the direct outcomes of the habit are satisfactory. For example, Verplanken & Faess (1999) found that good intentions are not enacted if they are interfered with by existing habits. In such situation the short term rewards are inconsistent with one's long-term intentions and goals (e.g., Ouellette & Wood, 1998). Here we enter the realm of so-called 'bad habits'. These bad habits may relate to behaviours that have positive direct outcomes for the self, but negative consequences on the long run, such as smoking, speeding and a fat diet. Other habits may yield positive outcomes for the self, but at the cost of aggregate and future outcomes. These can be addressed as collectively 'bad habits'. Hence much social or environmentally detrimental behaviour can be addressed as 'bad habits', such as using a cell phone in an inappropriate situation, littering and using the car for very short distances.

Obviously, in many situations where it would be beneficial to change existing behaviour one is being confronted with the challenge to change existing habits. The strength of the habit here is an important determinant. The more frequent a habit is being performed, the more automated the choice process often will be. Hence the (yearly) habit to visit a certain holiday destination may be weaker than the (daily) habit of drinking coffee. As a consequence, many scholars define habits as behaviour that is being performed often (daily) in stable contexts. Ajzen (1987) pointed out the tautological reasoning behind this definition, and concluded that using past behaviour in causal models of human action is useless. As such, ultimately it is not the frequency of behaviour that determines the strength of a habit, but the degree to which the behaviour has been automated and is being performed without cognitive

elaboration. Thus, the more automated the behaviour is, the stronger the habit. When habits are weak, this process of change may be relative easy to initiate, but the stronger the habit, the harder it appears to change behaviour. To approach this challenge of changing 'bad habits', it is first necessary to understand how a habit is formed and what principles apply to the perseverance of habits.


## 2: Habit formation

The distinction between habits and reasoned behaviour is an old one, and has already been discussed extensively by James (1890). Current perspectives on habitual behaviour stress the importance of cognitive scripts that are being executed in familiar situations (Fiske & Taylor, 1991; Svenson, 1990; Schank, 1982; Schank & Abelson, 1977). A script reflects a specific rule stating that in a certain type of situation a specific response is adequate.  As such a script represents the knowledge structure behind the habit, and thus is not equal to the habit itself (e.g., Abelson, 1981). Situational cues may thus trigger the performance of a habit automatically (e.g., Verplanken & Aarts, 1999). If a situation is recognised as one in which a given behaviour is appropriate, a person appeals to such a script instead of comparing and elaborating the available options over and over again. Frequent repetition of behaviour will result in the development of such a script (e.g., Fiske & Taylor, 1991). A script hardly requires cognitive effort to be executed. Thus, individuals do not have to explicitly evaluate all aspects of the available options any more, which enables them to use their limited cognitive abilities in other domains. This has empirically been validated by e.g., Wood, Quinn & Kashy (2002), who demonstrated that during habitual behaviour people report having thoughts that are not related to the task, whereas during non-habitual behaviour people report task-related thoughts. On a very basic level this script reflects a recognition heuristic (Gigerenzer & Goldstein, 1996; Goldstein & Gigerenzer, 1999), which holds that when confronted with two objects one will select the one that is being recognised. Although the recognition heuristic has been identified using objects instead of (more complex) decision-situations, we assume the same recognition principle applies. A script can thus be conceived as a response on a stimulus (Ronis et al., 1989), and hence the principles of classical and operant conditioning seem to apply on this behaviour (see, e.g., Pavlov, 1927; Skinner, 1938; 1953). Here the decision-situation functions as the stimulus, and the behaviour as the response. The closer the reinforcement follows after performing the behaviour, and the more often a reinforcement follows after performing behaviour, the stronger the stimulus-response relation or script gets.  It is also likely that behaviour that is positively being reinforced will be tested in comparable situations (contingent reinforcement). These principles of conditioning can be linked with fylogenetic older brain structures, as the principles of conditioning have been demonstrated in many studies using e.g., rats and pigeons. Also the specific recognition heuristic has been observed in the Norway rat (Galef, 1987). In another vein, neuropsychological studies linked non-cognitive habit and skill memory to fylogenetic older brain structures such as the basal ganglia, cerebellum and motor-neocortex (Gabrieli, 1998; Squire, Knowlton & Musen, 1993). This linking of scripts or stimulus-response relation to specific brain structures is important in

understanding how behaviour may become automatised, and less accessible for cognitive reasoning associated with newer brain structures (cerebral cortex).

However, no matter how little cognitive effort performing a script may require, the habitual behaviour in question has been performed for the first time at a given moment. This first performance may have originated from various decision-processes; for instance, one may have deliberated about performing the behaviour, the behaviour may have been learned from one's parents or peers, or one may have imitated the successful behaviour of others. Andersen (1982) distinguishes three stages in the development of a (new) habit. In the first stage the information that is relevant for the behaviour is encoded in an internal representation. This so-called *declarative stage* involves cognitive processing as people rehearse the information in their working memory to keep it available for the interpretative procedures that guide behaviour. For example, people may encode the packaging design of a new brand of coffee, which helps them to retrieve this coffee on a next buying occasion. Attitudes, along with other considerations, are important in the initiation of habits (Ronis, Yates & Kirscht, 1989). Hence ecological and social considerations may play a role alongside aspects such as price, taste and appeal of the packaging of the coffee. In the second stage, people convert the information in a procedural form by practice. In this so-called *knowledge compilation stage* the habit is being formed, diminishing the necessary cognitive effort. In the *procedural stage* the habit has been formed. Still changes occur, in particular the speeding up of the process (script development, Fiske & Taylor, 1991). The cognitive linking of stimulus-response (or script) will strengthen the more often favourable outcomes in the short run (reinforcement) result from performing a particular behaviour (response) in a specific situation (stimulus). This increases the chance of performing the same behaviour the next time when encountering a similar situation. This effect can be described as reinforcement learning. Experiencing direct positive outcomes after performing the behaviour increases the motivation to repeat that behaviour. An important condition for habits to develop is that individuals are able and motivated to repeat that earlier behaviour (Verhallen and Pieters, 1984). Hence the outcomes of the behaviour must be satisfactory. Some outcomes may emerge directly, whereas other outcomes may be delayed. Also, some outcomes will affect the person directly, whereas other outcomes may affect larger groups of people. We assume that the experience of satisfaction will be dominated by the short-term personal outcomes, as these will emerge directly after performing the behaviour, and have the greatest personal impact.

To understand how outcomes relate to the emergence of a habit we have to understand how basic human needs are being satisfied. Max-Neef (1992) developed an empirically grounded taxonomy of human needs comprising nine needs: subsistence, protection, affection, understanding, participation, leisure, creation, identity and freedom. Habits may yield outcomes that relate to these different needs. Sometimes, a habit may satisfy a single need. In such a case Max-Neefs speaks about the behaviour as a singular satisfyer. A habit may also satisfy multiple needs at the same time. However, it is also possible that a habit may satisfy one need at the cost of another need. The complicatedness of habitual behaviour partly resides in the different time and scale dynamics of the underlying needs. For example, a preference for a fat diet may have biological roots in optimising our calorie intake (need for subsistence), but in our modern times such a diet may cause obesitas in the long run and hence jeorpardise our health (need for subsistence). Hence, in a fylogenetic old brain structure we are 'programmed by

evolution' to like fat food, and our need for subsistence is immediately satisfied when eating such food. On the other hand, on a higher cognitive level we may be aware of the negative health effects of persisting the habit of a fat diet.

The distinction between different needs is important, as these needs relate to outcomes that differ with regard to their visibility for the habitual mechanism due to their cyclical reward pattern. Some needs follow a shorter cyclical reward patterns than others. Whereas the need for subsistence requires multiple meals a day, the needs for identity may require following studies and developing a career, and hence involve long-term dynamics. Especially needs that are old from an evolutionary standpoint, such as subsistence and protection, may display very short-term dynamics, although long-term dynamics also affect these needs, such as a fat diet jeopardising health (subsistence) in the long run. Also Max-Neef adheres to an evolutionary perspective on needs when stating that fundamental human needs are essential attributes related to human evolution (Max-Neef, 1992, p. 204). The needs that organisms try to fulfil are being considered to be co-evolved along with the evolution of brain structures. Whereas reptiles are only 'concerned' about basic individual needs such as food, sex and perhaps safety, higher animals clearly demonstrate higher social needs. Most mammals demonstrate a need for affection and participation, which explains why most people prefer a dog or a cat to a lizard as a pet. Primates and man also demonstrate self-reflective needs, such as identity and the exploration of an environment. In the context of human decision making the basic idea here is that 'lower' needs are associated with fylogenetic older brain structures. The nine needs Max-Neef distinguishes can be condensed in basic individual needs, social needs and self-reflective needs, which allows for a basic linking to respectively the spinal system/brain stem, the cerebellum and the cerebral cortex.

This is an important issue in the context of understanding how behaviour satisfies our various needs, and what decision strategies we are most likely to use in satisfying those needs. Basically, we state that fylogenetic older needs (e.g., subsistence – food) are likely to follow both short-term and longer-term life cycles, whereas newer needs (e.g., identity) involve processes that exclusively involve longer time-spans. Because much behaviour satisfies different needs at the same time, different time-cycles often play a role at the same time. Whilst the higher long-term needs may play a role in deciding what behaviour to perform, the moment the behaviour has been transformed to a habit only short term outcomes will be experienced, and hence the short-cyclical 'lower' needs will dominate the continuation or change of the habit. Often this is no problem for as long as the long-term outcomes remain positive. For example, having the habit of eating plenty of fruit can be considered to be a 'good habit'. One may simply enjoy eating the fruit, whilst not being consciously aware of the long-term health benefits each time a piece of fruit is being consumed. The short-term enjoyment of eating fruit may be sufficient to persist the habit. However, there are also situations where the short-term and longer-term outcomes are conflicting. Most of us remember situations where we habitually continue to eat candy or savoury snacks whilst knowing we will end up feeling not too well. This is a typical example of how two different needs having different time-scales may collide, often in favour of the short-cyclical need, which in this example is the experience of a fine taste. This example also demonstrates that one may be aware of the negative outcomes in the (near) future, but that the direct satisfaction of the short cyclical need still may dominate the behaviour. Even if new information

concerning negative outcomes in the long run becomes available, it may be so that the short cyclical-needs remain dominating the behaviour, thus persisting the 'bad habit'. Using this framework, we can define an addiction as a conflict between attitudinal or 'cortical' motives to stop behaviour, and the habit mechanism ('brain stem-cerebellum' motives) favouring the behaviour. Importantly, formulating addiction as a conflict between the outcome perceptions of separate brain structures holds that a person can be considered to be addicted without performing the addictive behaviour.

Whereas cognitive efficiency thus constitutes a major advantage of habits, on the other side of the medal we find the disadvantages of obsolete information. Whereas many habits yield (near) optimal outcomes, a current habit may also yield far from optimal outcomes because new, better behavioural opportunities may have been introduced in the meantime, or new information on previously unknown negative outcomes of the habitual behaviour has become available. People may be aware of these new opportunities and new information at the attitudinal level, but this information may not affect their habitual behaviour. Triandis (1977, 1980) for example reviews literature on attitude behaviour relations, demonstrating that the longer a behaviour has been repeated, the stronger the habit will be and the less it will be correlated with and predicted by attitude (e.g., Aarts, Verplanken, & Van Knippenberg, 1998; Verplanken, Aarts, Van Knippenberg, & Moonen, 1998). It may also be the case that the conflict between a habit and new information causes cognitive dissonance, which can be resolved by trivialising or rejecting the information. Trivialisation or rejecting dissonant information may be a lot easier than actually changing one's habit. For example, information on the negative environmental impacts of car driving are often refuted by questioning the seriousness of the problem, blaming the industry as a bigger pollutant and trivialising ones own contribution to the problem (e.g., Tertoolen, 1994, Steg, 1996) It can be assumed that the stronger the habit is, the more likely it is that people prefer to resolve a cognitive dissonance by refuting dissonant information.

Consequently, whereas habits are frequently very efficient and necessary strategies that help us performing routine behaviour, this automating of behaviour may also cause people to behave in an inefficient or even detrimental manner. A well-known example here is smoking. Despite the fact that most smokers are well aware of the long-term health-risks associated with smoking, most smokers continue smoking. Many of them tried to stop for a while or quit the habit, but still experience the craving for a cigarette. People usually start smoking consciously to establish an image of toughness, maturity and independence form authority (Ronis, Yates & Kirscht, 1989), or to comply with pressures from their friends (Leventhal & Cleary, 1980). Hence it is usually social and identity needs that stimulate to start smoking. In the beginning one may experience a negative effect on health in a physical unpleasant experience of dizziness and coughing. However, this negative physical experience changes rather quickly into a pleasant sensation as people get used to inhaling smoke and experiencing the effect of nicotine (metabolic change). After a while people will experience negative physical sensations when their nicotine level is low. Hence besides social and identity needs, also a short-cyclical physical need is contributing to the short-term need satisfaction smoking provides. This stimulates the emerging of a very strong habit, for example, smokers often report that they find themselves smoking a cigarette without remembering the decision to smoke or having picked up a

cigarette (Ikard, Green and Horn, 1996). Even when people become more aware of the negative health effects on the longer run, their behaviour is mostly being governed by their habit. From the earlier definition of addictions we can see here the conflict emerging between 'cortical' motives to stop smoking, and 'brain stem-cerebellum' motives to continue smoking. This conflict may persist after quitting smoking, as many ex cigarette smokers sometimes crave for a cigarette even long after quitting the behaviour for health reasons. Also the cognitive dissonance of the conflict between the smoking habit and the information on health hazards is often resolved by trivialising dissonant information, and overweighting consonant information (the 98 year old smoker example).

Processes where stimuli are experienced more positively the more frequent they are being experienced, such as smoking, are very common. The mere-exposure effect, as identified by Zajonc (1968), may be responsible for a part of this effect. Zajonc (1968) demonstrated that the mere exposure to a stimulus, e.g., a nonsense word, people, abstract and representational visual images, and types of music, increases people's liking of these stimuli. The longer the exposure, and the more homogeneous the exposure sequence, the more people become satiated, and thus the lower the mere-exposure effect gets. The mere-exposure effect is the strongest when the exposure duration of the stimulus is short, and when exposure sequences are varied. The exposure effect has also been demonstrated in rats (Cross, Halcomb & Matter, 1967), suggesting that this is a deep-rooted principle in behavioural adaptation. Also foods with a distinctive taste are usually liked more after repeated consumption (e.g., Zellner, 1991; Stevenson and Yeomans, 1995). Hence, in many situations a habit may become stronger over time because the (already positive) short-cyclical outcomes are becoming more positive.

Delayed negative outcomes do not affect the habitual behaviour for as long as the direct outcomes are positive and the script governs the behaviour, even if information on these negative outcomes is available in ones memory. Extreme examples are the use of substances, like tobacco, alcohol and heroin[1]. This explains why the correlation between attitudes and behaviour is usually low, especially when the behaviour has been performed for a prolonged period of time (Triandis, 1977; 1980). Much consumptive behaviour is embedded in relatively stable consumption patterns, which can be conceived as forms of habitual behaviour. Consequently, behaviours like the buying of food, the use of appliances (cars, showers, domestic appliances) and the disposal of rubbish are mostly performed in a habitual manner. The precise content of a habit determines if it should be considered to be a 'bad habit'. The question is how people can be assisted in quitting 'bad habits'.


## 3: Breaking a habit

As discussed in the previous section, people usually persist in a habit because the direct personal outcomes are satisfying. Reasons to quit a 'bad habit' usually relate to

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1 Whereas the first use of these substances may be a less pleasant experience, the social rewards may stimulate repetition of its use, allowing the development of a strong positive physical reinforcement.

the negative consequences of the habit on the long run and/or on the social/physical environment. Because a habit involves that new information is not taken into consideration, it is often very hard to change habitual information using a persuasive message. Moreover, when information promotes alternative behaviour one may not recognise it as relevant for the own situation. For example, information on a new biking road may not be noticed because one always goes by car. The most effective way to change a habit is to make it impossible. For example, closing the shopping centre of a town for car-traffic can break the habit of shopping by car, and changing the menu of a canteen may break an unhealthy lunching habit. It is obvious that such measurements cannot be used in a wide variety of settings, as they interfere with people's freedom of choice and may elicit strong resistance. A next effective strategy involves changing the situation (stimulus) in a way that the script is not automatically being activated. For example, people trying to overcome an addiction should avoid the circumstances in which they performed the behaviour a lot (e.g., smoking in bars), although it is often not possible to avoid all script triggering stimuli. A next strategy is aimed at changing the direct experienced outcomes in case the habit is being performed. A very nice example here is to quit the biting of fingernails by applying a nasty tasting substance on the nails. Here one's cognition decides to change the outcomes of the habit, being well aware that the short-cyclical satisfaction will suffer for a while. Other strategies like this are an anti-alcohol pill, which makes one very sick after drinking even a bit of alcoholic beverage or operatively placing a special balloon in one's stomach to diminish one's appetite. Whereas these actions may be originated by one's own cognition in order to change a habit, often another individual or group wants to change your habit. For example, to stop people from driving too fast in an urban area, traversal ripples are being made in the tarmac, making a too high speed into an unpleasant bumpy and noisy experience. Not only is it possible to make the 'bad habit' less rewarding, it is also possible to make the 'good habit' more rewarding. To stimulate people to throw their waste not just on the street when driving or biking, special catching nets are being placed on the road sides in parts of the Netherlands, transferring the proper disposal of waste into a directly-rewarding kind of game.

However, no matter how effective it is to change the short-term outcomes of a 'bad habit', often it is impossible to realise this due to legal and/or financial barriers. For example, it is physically impossible to make smoking impossible in a building, and to make speeding impossible would require expensive changes in the infrastructure, or the introduction of a very expensive and complex vehicle control system. Therefore, often the outcomes of a 'bad habit' may be changed on a more indirect level by setting rules and punishment for breaking the rules. Examples are fines for smoking in a non-smoking area and speeding. Important is that the people are aware of the rule, and preferably of the intensity of control (chance of being fined) and size of the fines. Again, this information is processed at a more cognitive level, and hence may not have a too strong effect on the habit because the direct outcomes remain unchanged. Especially when the time between violation and fine is long, the habit will hardly be changed, and people will experience the fine as unfair (e.g., as often is the case in speeding tickets). Especially when the information on control and the size of the fine is unclear, a cognitive dissonance effect may cause people to underestimate the chances of being fined, thus persisting in their habit. Also when the

chances of being fined are low, and the fines are low, the chances are high that one will persist the habit because the habit still yields satisfying outcomes.

Usually a lot of effort is being spent in informing people about the long-term consequences of 'bad habits'. Especially 'bad habits' concerning health and the environment have been targeted with informational campaigns. The trivialising of dissonant information becomes more difficult the more clearly and unquestionable the information is. Whereas the uncertainty on the greenhouse effect may cause people to refute information on the necessity to diminish their energy consumption, the clear-cut relation between smoking and health problems is more difficult to refute. Especially when the information is being delivered at the moment the habit is being performed the effect may be strong. For example, providing very visible information on the negative effects of smoking on packages of cigarettes has demonstrated a noticeable effect on the quantity of cigarettes people smoke (Teeboom, 2002). In earlier research we also demonstrated that prompting information at the time the habit was being performed (taking the elevator in a university library, a behaviour which we assume to be habitual for the visiting students) with a relevant personal belief (taking the stairs is healthy) resulted in a strong behavioural change (Jager, Boers, Eckringa, Westerhof, 1996).

Whereas in the above examples the information provided focuses at the negative outcomes of the habit, informational strategies are also essential in communicating the positive outcomes of alternative behaviour. Both the short-term and long-term positive outcomes can be communicated in stimulating people to try the alternative behaviour. For example, in communicating the advantages of biking one could stress the enjoyment of engaging in an outdoor activity, the possibility of expressing your personality with a certain type of bike, health benefits of regular exercise and the environmental benefits of lowering your fossil fuel consumption. Of course this information is only taken into consideration when people think about alternative behaviour. Hence, making the existing habit impossible or changing its direct outcomes is a prerequisite for information on alternative behaviour to be effective. However, in stimulating that people abandon the script and start thinking about alternative behaviour it is important that people experience direct negative outcomes after performing the 'bad habit'. Hence a positive informational campaign should be accompanied with a change of the situation and short-term outcomes of the existing habit. When a person is being confronted with the impossibility of performing the habit, or with unsatisfactory outcomes of performing the habit, it is likely that he/she will think about behavioural alternatives, and the information provided in the informational campaign will affect ones decision in trying the behaviour that is being advocated. When performing that behaviour yields direct positive outcomes, chances are positive for a new habit to emerge. Here one should be alert for the development of new 'bad habits'. If there are indications of the development of a new 'bad habit', one should take immediate measurements to prevent its development and spreading.

Recapitulating, changing a habit will be most effective when (1) the existing habit is being blocked by making the performance of the habit impossible, removing situations/stimuli that activate the script behind the habit, and attaching short-term negative outcomes or removing short-term positive outcomes from performing the habit, (2) clear and direct information is made available on the negative (long-term)

outcomes of the habit, and on the positive outcomes of alternative behaviour(s), preferably during or close to the decision-making process, and (3) the alternative behaviour(s) provide(s) short-term positive outcomes, maximising the chances of a new habit to emerge. Whereas a policy maker can change several outcomes, and the provision of information can also be controlled to al pretty large extend, the short-term social rewards of habits are very difficult to target with policy measures. For example, driving a scooter or moped may contribute to a 'cool' image amongst youngsters. The more such short-term social outcomes determine the habit, the more difficult it gets to change the habit. Recent campaigns against smoking and drunk driving were however targeting the social outcomes of the habits, and apparently this generated quite a lot of discussion, which may reflect a norm-adaptation process. In researching the conditions for changing a habit one must estimate the importance of short-term social rewards, and preferably follow the autonomous process of the change of these rewards. If possible, it may be very effective to align policy measures with an emerging trend or fashion, thus utilising autonomous processes for changing bad habits. For example, the fitness trend offers possibilities to promote biking as a means for commuting. At a more fundamental level research could focus on identifying the typical short-term and long term outcome systems attached to habits, identify how these outcomes are related to different needs and study how this affects the process of changing habits.

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