Habit Formation Research

**Erica Edelman**

Contents

[Introductory Information 2](#_Toc318215113)

[Prompt 2](#_Toc318215114)

[Layout, Organization, and Other Considerations 2](#_Toc318215115)

[Research Info 2](#_Toc318215116)

[Who’s Who 2](#_Toc318215117)

[Areas for Further Research 3](#_Toc318215118)

[Brief Overview 3](#_Toc318215119)

[Open Questions 3](#_Toc318215120)

[Habit Formation- An overview 4](#_Toc318215121)

[Recommendations 7](#_Toc318215122)

[Teach a Habit Formation Class 7](#_Toc318215123)

[Utilize High-Level Construals when making habit formation plan 7](#_Toc318215124)

[Pay special attention to the first few days/weeks of habit formation 8](#_Toc318215125)

[Utilize pre-existing habit loops 8](#_Toc318215126)

[Rationality Camps 9](#_Toc318215127)

[Take a Vacation or Move, if needed 9](#_Toc318215128)

[Individual Overview of Cited Works 9](#_Toc318215129)

[Habits—A Repeat Performance 9](#_Toc318215130)

[How are Habits Formed: Modelling Habit Formation in the Real World- Phillipa Lally 11](#_Toc318215131)

[-The Habitual Use of the Self-report Habit Index 13](#_Toc318215132)

[-‘The Habitual Use of the Self-report Habit Index’: A Reply 13](#_Toc318215133)

[-How Long to Form a Habit? – PsyBlog 14](#_Toc318215134)

[-How to Form a Habit- British Psychological Society’s Research Digest 14](#_Toc318215135)

[How do Habits Guide Behavior? Perceived and Actual Triggers of Habits in Daily Life- Neal 15](#_Toc318215136)

[The Power of Habit by Charles Duhigg 16](#_Toc318215137)

[-“How Companies Learn your Secrets” -The New York Times 17](#_Toc318215138)

[A New Look at Habits and the Habit-Goal Interface 18](#_Toc318215139)

[Running Head: Construals and Prospective Self-Control—Promoting Prospective Self-Control through Abstraction 19](#_Toc318215140)

[-How to Improve Your Self-Control 20](#_Toc318215141)

[Habits as Knowledge Structures: Automaticity in Goal-Directed Behavior 21](#_Toc318215142)

[TEDxAlAin: Why creating supportive habits is the best way to obtain your goals 21](#_Toc318215143)

[Citations 22](#_Toc318215144)

# Introductory Information

## Prompt

The following is the prompt for this research:

“Do a literature review on the question below and write up your own summary of the most important things you find, including citations, quotes from key paragraphs, and criticism of studies that were poorly designed or showed other problems.

The research question: "What is known about habit change, that should potentially affect the character of our rationality teaching (since we are trying to train people to have different thinking habits)?"

## Layout, Organization, and Other Considerations

I based research and writing decisions on the fact that this overview is meant to be read and easily understood by someone else, who I assume will then either use the information or make a discussion post. Therefore I decided to use Plain English, over academic language.

In case the reader wants more information, I also included pop-psych reviews of some of the studies I posted, which convey the gist of the information much more quickly and easily than the studies themselves. Where possible, I found and utilized sources that were NOT behind a paywall, so that others could read them as well.

Finally, rather than imposing an artificial layout, I organized it in a way that seemed most natural to me: The answer to the prompt is in the overview. Citations and reviews of specific articles, books, etc follow. Select longer works have more detailed notes in a separate document.

# Research Info

## Who’s Who

Some prolific researchers in habit formation:

Phillipa Lally, Wendy Wood, and David Neal are a cohort of sorts, as they have all co-authored papers with each other in various groupings. They tend to focus on context cues as forming habits, and less on rewards and goal pursuits.

Aarts and Dijksterhuis are highly cited, but very hard to read.

Kentaro Fujita has published a lot on construal levels, especially as they relate to self-control and goal pursuit. I only reviewed one article by him, as the subject is only marginally related, but I recommend further work in that area.

## Areas for Further Research

**Goal pursuit, Self-control, Self-regulation, Intention implementation,**

Habits are automatic functions, but *getting* an action to become habitual often requires focusing on goals and/or using self-control. I recommend these fields as being extremely useful to the question you are asking.

As an example, the article “Implicit coordination: Sharing goals with similar others intensifies goal pursuit” by Shteynberg and Galinsky, implies that having participants of rationality training share their goals with each other may lead to more goal-congruent behavior (such as maintaining a new habit).

Various factors can affect levels of self-control. Higher levels of self-control lead to being able to disrupt or implement a new habit more successfully. Therefore, self-control and self-regulation can also be useful topics.

Finally, intention implementation means making “if-then” plans, which I think could also be a useful study for the activities you are looking at. (i.e. “If I notice I am using fallacy X, then I will…”)

# Brief Overview

## Open Questions

I am placing this section before the Overview, so you know beforehand which areas have multiple opinions. I have also given my personal opinion on the question so that the reader can be aware of potential bias.

**How do habits form?**

There are many theories, and Neal does a good overview in “Habits—A Repeat Performance” which is summarized below. From my research so far, I would support the “Multiple Formation Mechanisms” camp, which says that there are many different ways to form habits, such as using goals, rewards. Trying to achieve a goal, or receiving a reward, will lead to repetition of an action. Repetition of an action will lead to habit formation. Once a habit has been strongly formed, automaticity takes over, and said goals and rewards are no longer relevant to habit repetition.

**How important is goal pursuit in habit development?**

Aarts and Djiksterhuis think it is very important. Wood, Lally and Neal think it is one route of many towards automaticity. I agree with the latter.

**What role do rewards play?**

In his pop psych book, Duhigg claims that rewards are an essential part of the cue-habit-reward loop. Lally thinks that habit completion itself is enough of an intrinsic reward. I think there’s a good amount of research that shows that rewards CAN be very effective, but I think it is probably one of many methods of habit development.

**What counts as strong experimental methodology in measurements of habit formation?**

Lally et al and many other researchers use methodologies such as the Self-Report Habit Index (SRHI) which is a daily survey that asks questions such as “How hard would it be to NOT do this task?” etc. However self-analysis is not a good measure of how automatic a task is, since automaticity means there is no conscious thought required to engage in the behavior. Lally admits that the SRHI isn’t the most accurate of measurements, but she holds that these quick and relatively cheap tests are a good indicator to find trends that could use further research.

I agree with this sentiment, but suggest caution to when reading results, to remember the weak methodologies. This debate is covered in “The Habitual Use of the Self-Report Habit Index” and its reply, which are both reviewed below.

Other questionable methodologies used by Lally include flashing words and not-words up very briefly on a screen, and seeing if participants can tell if they were shown words or not.

## Habit Formation- An overview

Habits are actions that are done repetitiously, leading to a level of automaticity. An automatic behavior is one that has all or some of the following four features: efficiency, lack of awareness, unintentionality, and uncontrollability.

As a habit is formed, the action changes from having to be thought about consciously to being completed subconsciously. These subconscious behaviors are controlled by a part of the brain called the basal ganglia, which is present in all vertebrates.

There are a number of theories on how these habits are formed, and Neal gives a good overview of these:

**METHODS OF HABIT FORMATION**

**Direct Context Cuing**-

Do an action in response to a cue long enough and it will form a direct link in your brain. This action becomes automatic and does not require goals, motivation, etc. Habit formation likely involves a shift to direct context cuing.

According to the direct-context-cuing model, repeated coactivation forges direct links in memory between context and response representations. Once these links are formed via associative learning, merely perceiving a context triggers associated responses…

When rats initially perform an instrumental behavior (e.g. pressing a bar for a food pellet), they appear to be guided by specific goal expectations; they cease the behavior if the reward is devalued (e.g., by pairing it with a toxin). In contrast, when rats have extensively repeated a behavior, their responses appear to be cued directly by contextual stimuli (e.g., the bar); reward devaluation has little impact on continued performance. These data are commonly interpreted as indicating that habit formation involves a shift to direct context cuing.

**Implicit Goals-**

In implicit-goal models, habits develop when people repeatedly pursue a goal via a specific behavior in a given context. An indirect association then forms between the context and behavior within the broader goal system…

Goal-driven responses tend to be dynamic and ﬂexible, as evidenced by people sometimes substituting behaviors that serve a common goal. In contrast, habits emerge in a rigid pattern such that, for example, a habitual runner is unlikely to substitute a cycling class for running. Thus, although implicit goals provide potentially powerful guides to action, they do not plausibly explain the context cuing of habits.

**Motivated Contexts-**

“Context” is another word for “cue”.

[C]ontexts can acquire diffuse motivational value when they have preceded rewards in the past. When contexts predict rewards in this way, they energize associated responses without activating specific goals… For example, when monkeys ﬁrst learn that a feature of the environment (e.g., a light) predicts a reward (e.g., a drop of juice) when a response is made (e.g., a lever press), neurotransmitter activity (i.e., dopamine release) occurs just after the reward. After repeated practice, the animal reaches for the lever when the light is illuminated. Furthermore, the neurotransmitter response is no longer elicited by the juice but instead by the light.

**Multiple Habit Mechanisms-**

Habits form in many ways. Goals and rewards contribute to repetition. Repetition leads to context cuing.

In Duhigg’s pop-psych book, he simplifies this into saying habit formation is caused by repetition of a cue-habit-reward loop which becomes more and more automatic as it is repeated:

“Habits…emerge because the brain is constantly looking for ways to save effort. Left to its own devices, the brain will try to make almost any routine into a habit, because habits allow our minds to ramp down more often.” (p 17)

An efficient brain is adaptive because it leads to smaller head size for the same cognitive power, and allows us to stop thinking about basic behaviors like walking, so we can devote mental energy to things like inventing spears.

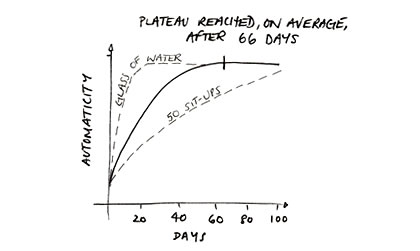
“But conserving mental effort is tricky, because if our brains power down at the wrong moment, we might fail to notice something important, such as a predator hiding in the bushes….So our basal ganglia have devised a clever system to determine when to let habits take over. It’s something that happens whenever a chunk of behavior starts or ends.”

Brain spends a lot of effort at the beginning of a habit looking for a cue that offers a hint as to which pattern to use. At end of pattern, when reward appears, the brain shakes itself awake and makes sure everything unfolded as expected.

However, due to the genre of the work, Duhigg glosses over the nuances in habit formation.

Lally has done studies showing that the automaticity of a forming habit over time is an asymptotic graph. What this means is that the automaticity of forming a habit is not linear, but rather grows more quickly in the beginning, and the levels off as it nears an asymptote, or plateau. The median time to reach an automaticity level of 95% of the asymptote (in other words to near the plateau) was 66 days, with a range of 18-254 (projected) days.

The asymptotic trend was strongest with participants who did not skip a significant number of days. Missing many days would lead to weak or non-existent habit formation. Luckily, missing a single day caused a non-significant (very small) drop in automaticity the following day (the habit was perhaps slightly harder the next day), but caused no effect overall.



Fujita studies something called “construal levels” and how they relate to self-control. A “Higher-Level Construal” means thinking in a way such as seeing the forest instead of the trees, looking at why you want to meet your goals rather than how you are going to, and looking at larger groupings of things (mammals) rather than more specific groupings (koala).

Fujita’s experiments show that being in a higher-level construal led to utilizing pre-commitment devices more strongly. A pre-commitment device is a method of making a current decision to help future-you reach your goal. Examples are choice bracketing (similar TDT, where a single choice affects future choices), and self-imposed punishment (i.e. stickK.com , or volunteering to pay money if you miss an appointment).

This affect only occurred when participants act towards a goal they personally feel is important. Actions protecting unimportant goals are unaffected by level of construal.

This is useful to habit formation, in that high-level construal (which can be induced) leads to focus on goals and self-control, which is useful in the early stages of habit formation.

Habit change can occur upstream or downstream of a cue; Downstream means fighting the instinctual cued habit action. Upstream requires vigilance in avoiding or changing cues.

Moving is widely regarded as a great time to implement habit change. This is because most of the usual context cues have either changed or been removed. This puts your actions back into conscious control and you can choose to develop new habits, without having to fight the context cues of the old ones.

# Recommendations

## Teach a Habit Formation Class

Studies show that *knowing* how habit formation works is actually beneficial in introducing new habits. Understanding what cues are, and how to utilize them, allows for more effective habit formation practices. Therefore, if you want people to develop new habits, it is useful to teach a short class on habit formation before attempting to introduce new habits to participants. This class can be brief, but at minimum should cover the role of context cues and the automaticity of habits.

## Utilize High-Level Construals when making habit formation plan

Inducing high-level construals will make participants more goal oriented (while in this frame of mind) and more likely to set up prospective self control to stick to their new habit.

To induce high-level construals, before participants make a plan as to how to enact habit, iteratively ask why they are pursuing this specific goal. Example:

-Why do you want to maintain a healthy lifestyle?  
 -So that I don’t get sick.  
 -Why do you want to not get sick?  
 - Because it makes me less productive.  
 -Why do you want to be productive?  
 -….etc.

After running this exercise, participants will be more willing to engage in prospective self-control measures (iff they care about the goal they are working toward). For example, they will be more willing to:  
  
 -Throw away items that would be a detriment to their goal (junk food, video game accounts)  
 - Make a public announcement about their habit formation plans that they would be embarrassed to not live up to.  
 -Set up a stickk.com account that will donate their money if they do not maintain their habit.  
 -Set up methods to enforce desired habit. (i.e. if they want to start the habit of not checking facebook during the day, then they would be more willing to install a program that would block facebook during specific hours)

Remember, focusing on goals will change how you *intend* to behave, but actual habit change is best done by targeting the cues/contextual triggers of said habit.

To utilize this in rationality training, have participants focus on goals before coming up with their *plan* for habit change, but make the actual plan and actions focus on habit cues.

## Pay special attention to the first few days/weeks of habit formation

Due to the asymptotic growth of habit formation, the earliest days of maintaining a habit are the least automatic, and therefore the most difficult to maintain. Recognize this, and take actions to pay special attention to these early days. Ideas include:

-Partner people up. Make partners responsible for checking in and applying social pressure at non-completion of habit.  
 -Call partner shortly before time they are supposed to engage in habit  
 -Report habit success to partner. Give each other encouragement  
 -Make contextual cues more obvious than normal, if possible. For example if you want to do a habit immediately after brushing your teeth, then put a piece of tape or string around your toothbrush as a reminder.  
 -If possible/needed take a vacation in order to disrupt currently existing habits.

## Utilize pre-existing habit loops

Instead of trying to create a brand new habit, try to incorporate your desired habit into a pre-existing habit loop. For example, instead of trying to start doing sit-ups at a random time, incorporate it into a pre-existing routing (i.e. do sit-ups right after your daily run, or as soon as you get home, while the water for your tea is boiling, etc) (Note- I ONLY saw this idea in the pop-psych book, so I give it less weight than the other suggestions. However, the reference list for that book was very well-organized, so I assume the study that this information is from can be found, if interested.)

## Rationality Camps

Times like Rationality Boot Camps and Mini-Camps are a great opportunity to change habitual behaviors. Being in a completely new setting for a significant period means that you will not be around your usual habit cues, and can therefore mindfully create new habit cues. By the time you go back to your everyday life, the new context cues will already be in place, and it will be much easier than trying to create the new habit while fighting the old context cues

Also, the earlier days in habit formation are much harder than the later days (habitualness over time is an asymptotic graph), therefore having the social motivation and lack of old cues helping participants past the first few days-weeks is extremely helpful.

When making habits at a rationality camp, make sure cues are chosen which will not get disrupted when the participant returns home. For example “I do Habit X after the first class session” is NOT a good cue, because it will not be around after the participant goes home. However “I do Habit X right after lunch” is a much better cue (provided that lunch is done similarly at rationality camp as at home).

## Take a Vacation or Move, if needed

Outside of rationality camps, when one wants to change their habits and doesn’t want to wait for serendipitous timing of life changes, then one can induce new settings and environments to help create those changes. An extreme example of this would be moving to a new city, either temporarily (take a month off work) or permanently. More minor examples could be: switching jobs, changing universities, or moving apartments. Of course, the life change must be related to the desired habit change. For example switching jobs might help you re-write work-related habits, but would probably not help with diet related habits. As this is an extreme action, I would recommend it only for extremely dangerous or helpful habits (i.e. addictions, depression, lack of motivation).

# Individual Overview of Cited Works

## Habits—A Repeat Performance

**Citation**: Neal, D. T., Wood, W., & Quinn, J. M. (2006). Habits—A Repeat Performance. *Current Directions In Psychological Science (Wiley-Blackwell)*,*15*(4), 198-202. doi:10.1111/j.1467-8721.2006.00435.x

**Abstract**: Habits are response dispositions that are activated automatically by the context cues that co-occurred with responses during past performance. Experience sampling diary studies indicate that much of everyday action is characterized by habitual repetition. We consider various mechanisms that could underlie the habitual control of action, and we conclude that direct cuing and motivated contexts best account for the characteristic features of habit responding—in particular, for the rigid repetition of action that can be initiated without intention and that runs to completion with minimal conscious control. We explain the utility of contemporary habit research for issues central to psychology, especially for behavior prediction, behavior change, and self-regulation.

**Overview**: This article is an excellent review of competing theories in regards to habit formation.

Although a consensual perspective on habit mechanisms has yet to develop, common to all views is the idea that many behavioral sequences (e.g., one’s morning coffee-making routine) are performed repeatedly in similar contexts. When responses and features of context occur in contiguity, the potential exists for associations to form between them, such that contexts come to cue responses.

**METHODS OF HABIT FORMATION**

**Direct Context Cuing**-

Do an action in response to a cue long enough and it will form a direct link in your brain. This action becomes automatic and does not require goals, motivation, etc. Habit formation likely involves a shift to direct context cuing.

According to the direct-context-cuing model, repeated coactivation forges direct links in memory between context and response representations. Once these links are formed via associative learning, merely perceiving a context triggers associated responses…

When rats initially perform an instrumental behavior (e.g.,pressing a bar for a food pellet), they appear to be guided by specific goal expectations; they cease the behavior if the reward is devalued (e.g., by pairing it with a toxin). In contrast, when rats have extensively repeated a behavior, their responses appear to be cued directly by contextual stimuli (e.g., the bar); reward devaluation has little impact on continued performance. These data are commonly interpreted as indicating that habit formation involves a shift to direct context cuing.

**Implicit Goals-**

In implicit-goal models, habits develop when people repeatedly pursue a goal via a specific behavior in a given context. An indirect association then forms between the context and behavior within the broader goal system…

Goal-driven responses tend to be dynamic and ﬂexible, as evidenced by people sometimes substituting behaviors that serve a common goal. In contrast, habits emerge in a rigid pattern such that, for example, a habitual runner is unlikely to substitute a cycling class for running. Thus, although implicit goals provide potentially powerful guides to action, they do not plausibly explain the context cuing of habits.

**Motivated Contexts-**

[C]ontexts can acquire diffuse motivational value when they have preceded rewards in the past. When contexts predict rewards in this way, they energize associated responses without activating specific goals… For example, when monkeys ﬁrst learn that a feature of the environment (e.g., a light) predicts a reward (e.g., a drop of juice) when a response is made (e.g., a lever press), neurotransmitter activity (i.e., dopamine release) occurs just after the reward. After repeated practice, the animal reaches for the lever when the light is illuminated. Furthermore, the neurotransmitter response is no longer elicited by the juice but instead by the light.

**Multiple Habit Mechanisms-**

Habits form in many ways. Goals and rewards contribute to repetition. Repetition leads to context cuing.

**BEHAVIOR PREDICTION**

Intentions can be used to predict future behavior only when habits are weak or mid-range. When habits are strong, then intentions have no effect on future behavior; People with strong habits repeat past (habitual) behavior regardless of intentions. (i.e. If you habitually eat fast food on your way home from work, you will continue to do so, even if you intend not to.)

**BEHAVIOR CHANGE**

Since intentions do not affect strong habits, changing people’s minds in regards to what they *should* do, does not necessarily result in a change in behavior. A good time to change behavior is during context changes, such as moving.  
“Context change disrupted performance of strong habits, bringing them under intentional control.”

**SELF REGULATION**

Lowering self-control resources (for example, by having study participants do their everyday tasks with their non-dominant hand) lowers the ability to inhibit habits.

**Critique**: Although their source list tended a little too strongly towards their own works (6 of the 15 referenced works were authored or co-authored by Wood), I highly recommend this article for a read as a great overview of the competing theories in regards to habit formation.

## How are Habits Formed: Modelling Habit Formation in the Real World- Phillipa Lally

Phillipa Lally has published many articles on the subject, however most are behind a paywall. This one is available on EBSCO which even local libraries may have access to (ours does).

**Citation**: Lally, P., van Jaarsveld, C., Potts, H., and Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. *European Journal of Social Psychology,* , 40. p 998-1009. doi: 10.1002/ejsp.674

**Abstract**: To investigate the process of habit formation in everyday life, 96 volunteers chose an eating, drinking or activity behaviour to carry out daily in the same context (for example ‘after breakfast’) for 12 weeks. They completed the self-report habit index (SRHI) each day and recorded whether they carried out the behaviour. The majority (82) of participants provided sufﬁcient data for analysis, and increases in automaticity (calculated with a sub-set of SRHI items) were examined over the study period. Nonlinear regressions ﬁtted an asymptotic curve to each individual’s automaticity scores over the 84 days. The model ﬁtted for 62 individuals, of whom 39 showed a good ﬁt. Performing the behaviour more consistently was associated with better model ﬁt. The time it took participants to reach 95% of their asymptote of automaticity ranged from 18 to 254 days; indicating considerable variation in how long it takes people to reach their limit of automaticity and highlighting that it can take a very long time. Missing one opportunity to perform the behaviour did not materially affect the habit formation process. With repetition of a behaviour in a consistent context, automaticity increases following an asymptotic curve which can be modelled at the individual level.

**Overview**:

‘Automaticity’ is evidenced by the behaviour displaying some or all of the following features: efﬁciency, lack of awareness, unintentionality and uncontrollability.

Participants were asked to choose a healthy eating, drinking or exercise behaviour that they would like to make into a habit. The behaviour had to be one that (i) they did not already do, (ii) could be performed in response to a salient daily event (cue) and (iii) had a cue that occurred every day and only once a day. Examples of the behaviours chosen were ‘eating a piece of fruit with lunch’, ‘drinking a bottle of water with lunch’ and ‘running for 15 minutes before dinner’. Participants were asked to try to carry out the behaviour every day for 84 days.

Some participants quit, and others showed no signs of habit-formation. 48% of participants matched the modeled asymptotic curve.

“ individuals who performed the behaviour more consistently showed a change in automaticity scores which was modelled more closely by an asymptotic curve”

What this means is that the automaticity of forming a habit is not linear, but rather grows more quickly in the beginning, and the levels off as it nears an asymptote, or plateau. The median time to reach an automaticity level of 95% of the asymptote (in other words to near the plateau) was 66 days, with a range of 18-254 (projected) days.

Missing a single day caused a non-significant (very small) drop in automaticity the following day (the habit was slightly harder the next day), but caused no effect overall.

**Critique**: Although I appreciated her writing style, I felt like there were some deficiencies in this study’s methodology. (not enough to overturn the general conclusion, but enough to think that there are also other factors at play that did not get picked up) Firstly, between people dropping out, or otherwise failing to acquire their chosen habit, the model only fit 48% of the participants. This means the majority of participants failed to acquire the habit or did not give an accurate fit, and we do not know why.

The subjects were told to choose a health-related habit, but were not asked how important the goal of maintaining a healthy lifestyle was to them. This should have been asked, because there is possibly a strong tie between habit formation and goals. Perhaps those who failed in habit maintenance did not place a high value on health as a goal.

Also, there were no rewards provided to complete the cue-habit-reward loop. The author expected the activity to be “intrinsically rewarding”, since the participants would hopefully care about their chosen habit. The author also surmises that rewards might not be necessary in habit formation. While this is possibly true, it is an extra variable (some participants probably found completing their habit to be more intrinsically rewarding than other participants), and should have been held constant by giving all participants some sort of habitual reward.

Finally, the measurement used was a self-reported measure on a Likert scale. I don’t know what other more objective measure could have worked better (maybe calling them back a week and/or a month “after” the test and seeing how many had maintained their habit?), but relying solely on a subjective measure lowers my confidence in the results.

There are only 25 references, by 16 authors. This seems like a limited amount for this piece.

**Take-Away**: The first days in habit formation are going to be the most difficult. So if you want someone to form a new habit, be more engaged in the early periods (examples- remind them verbally, ask them if they completed it, send them a little reward after their first 5 completions). Long-term rationality camps will be most useful for this.

Don’t worry if a day is missed here or there. It will have no overall effect on habit formation.

**Critical Discussion**: The self-reported measurement utilized in this study is called the Self-report Habit Index (SRHI). I mention above that I found it to be a weak tool. There has been scholarly discussion as to its usage. See below:

### -The Habitual Use of the Self-report Habit Index

**Citation**: Sniehotta, F. F., , & Presseau, J. (2012). The Habitual Use of the Self-report Habit Index. *Annals of Behavioral Medicine*, *43*(1), 139 - 140. doi:10.1007/s12160-011-9305-x

**Overview**: The authors mention many concerns about the use of the SRHI in habit-related studies. One such concern is that habits require automaticity. In other words, if something is a habit, we do it without conscious thought. To then ask someone about their enactment of an automatic process may not yield proper results

The extent that one is aware of the critical contextual cues, of engaging in the habitual behavior, and of its outcomes, has implications for what can be self-reported. When a habit is operating outside of awareness, a self-report likely reflects an inference about one’s behavior based on the consequences of the habit (e.g., snacking habit inferred from an empty bag of potato chips) rather than on a report of the habit itself.

### -‘The Habitual Use of the Self-report Habit Index’: A Reply

**Citation**: Gardner, B., Abraham, C., Lally, P., , & Bruijn, G. (2012). ‘The Habitual Use of the Self-report Habit Index’: A Reply. *Annals of Behavioral Medicine*,*43*(1), 141 - 142. doi:10.1007/s12160-011-9317-6

**Overview**: The authors refute the claim that SRHI “is problematic because it assesses the central characteristic of habit (i.e. automaticity) together with its antecedent (repetition) and a possible consequence of automatic action (assimilation of the action into the selfconcept)… Acquisition through repetition…distinguishes habit from other forms of automaticity…”

They admit that SRHI isn’t the most robust methodology, but that it is good at finding trends that require more rigorous study.

“Most SRHI applications to date have been based on correlational data [1, 3]. Such studies are useful for identifying priorities for further investigation using more rigorous research designs…Progress in habit theory and application will require more robust methodological approaches.”

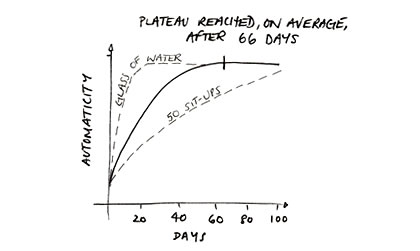
**Online Overviews**:

### -How Long to Form a Habit? – PsyBlog

**Citation**: J Dean. (2009, Sept 21). How Long to Form a Habit. [web log- PsyBlog] Retrieved from: <http://www.spring.org.uk/2009/09/how-long-to-form-a-habit.php>

**Overview**: This is a much shorter and easier to read overview of the Lally article, although it skips over some of the details and doesn’t cover the weaknesses of the study. Although the Lally article claimed 66 days was the *median* time to plateau, Dean calls it the average.

He does include this little graph (shown below), which is a better visualization (in terms of understandability) than the ones in the Lally article. Unfortunately he makes it look as if all tasks reach the same level of automaticity, when in reality drinking a glass of water with lunch will probably become much more automatic (and thus have a higher plateau) than doing 50 sit ups in the morning. (i.e. all the plateaus are at the same height, but they shouldn’t be)



### -How to Form a Habit- British Psychological Society’s Research Digest

**Citation**: C Jarret. (2010, Oct 6). How to Form a Habit. [web log- The British Psychological Society’s Research Digest]. Retrieved from: <http://bps-research-digest.blogspot.com/2010/10/how-to-form-habit.html>

**Overview:** This overview does slightly better in accurately portraying the results and mentioning flaws. However Jarret makes the same mistake as Dean in calling 66 days the average, instead of the median.

Jarret’s review of Lally:

“This research has a serious shortcoming, acknowledged by the researchers, which is that it depended entirely on participants' ability to report the automaticity of their own behaviour. Also, the amount of data made it hard to form clear conclusions about the need for consistency in building a habit. However, the study provides an exciting new approach for exploring habit formation and future research could easily remedy these shortcomings.”

## How do Habits Guide Behavior? Perceived and Actual Triggers of Habits in Daily Life- Neal

**Citation**: Neal, D. T., Wood, W., Labrecque, J. S., & Lally, P. (2012). How do habits guide behavior? Perceived and actual triggers of habits in daily life. *Journal Of Experimental Social Psychology*, *48*(2), 492-498. doi:10.1016/j.jesp.2011.10.011

**Abstract**: What are the psychological mechanisms that trigger habits in daily life? Two studies reveal that strong habits are influenced by context cues associated with past performance (e.g., locations) but are relatively unaffected by current goals. Specifically, performance contexts—but not goals—automatically triggered strongly habitual behaviors in memory (Experiment 1) and triggered overt habit performance (Experiment 2). Nonetheless, habits sometimes appear to be linked to goals because people self-perceive their habits to be guided by goals. Furthermore, habits of moderate strength are automatically influenced by goals, yielding a curvilinear, U-shaped relation between habit strength and actual goal influence. Thus, research that taps self-perceptions or moderately strong habits may find habits to be linked to goals.

**Overview**: This paper questions whether habits are actually driven by goals, or whether they occur automatically without regard for goals. They performed two studies of uncertain quality (see critique below) and conclude:

“When you drag yourself to the gym each morning, is the behavior due to your ardent hope of ﬁtting back into your favorite jeans or to myriad environmental cues that keep you locked into your morning habit? The present research suggests that strong habits – although perceived to be purposive and goal-dependent – are actually inﬂuenced by recurring triggers in the performance context. Yet goals did emerge as important in several ways. Across both studies, goals showed a highly ﬂexible pattern in guiding moderately strong habits.”

Despite my misgivings on their methodology, I find that their conclusion seems relatively sound—Goals are very important in early and middle stages of habit formation, but once the habit is strongly ingrained it becomes automatic and no longer requires the goal.

However, when questioned, the participants who had strongly ingrained habits still believed that their actions were goal-motivated, rather than automatic. The authors believe that this shows that more objective measures are needed for further experimentation:

“[This] highlights the need to study mechanisms of actual habitual control using methods that do not rely on introspection. Theoretically, the discontinuity plausibly arises from introspection illusions that may be especially likely when people are acting in an explanatory vacuum given the absence of introspective information about the causes of their habits. Perhaps because of a tendency to view their behavior as purposive, people make especially strong, fast inferences about goals. This ﬁnding complicates interpretation of habit experiments—it suggests that research on the actual mechanisms of habit performance cannot rely on judgments and inferences as tests of underlying mechanisms.”

**Critique**: The methodology for the first study was very hard to understand, but from what I can tell, they flashed either words or non-words (pictures?) on a screen for a couple milliseconds, and the participants chose whether they thought it was a word or not. They derived a conclusion based on the fact that strongly habitual runners can recognize the words “running” and “jogging” as words more quickly and accurately than the baseline rate, but that they do not recognize goal words (perhaps “healthy” and “happy”?) as well.

This does not seem like something to draw a strong conclusion from, as I would bet that habitual runners see the words “running” and “jogging” more often (in facebook comments, shoe ads, sports blogs, etc) and that could be what is affecting the participants’ accuracy in recognizing these words.

I also found their results section extremely hard to understand.

**Take-Away**: The authors were kind enough to provide their own interpretation of actionable items:

Given the illusory nature of goals in habit performance, people wishing to change these behaviors may be drawn to techniques that invoke goal setting and internal motivation. However, the ineffectiveness of such strategies is highlighted by the present ﬁndings, and also by a meta-analysis of 47 studies that used persuasive appeals and other interventions that changed people's behavioral intentions but changed behaviors primarily when they were not habitual. More successful habit change strategies likely target the speciﬁc contextual triggers of habitual behavior. These include vigilant monitoring of the unwanted response, environmental re-engineering, and stimulus control techniques to reduce exposure to the triggers.

In other words, focusing on goals will change how you *intend* to behave, but actual habit change is best done by targeting the cues/contextual triggers of said habit.

To utilize this in rationality training, have participants focus on goals before coming up with their *plan* for habit change, but make the actual plan and actions focus on habit cues.

## The Power of Habit by Charles Duhigg

**Citation**: Duhigg, C. (2012). *The Power of Habit: Why we do what we do in life and business*. New York, NY: Random House. (Partial copy) Retrieved from: <http://www.amazon.com/Power-Habit-What-Life-Business/dp/1400069289/ref=sr_1_1?ie=UTF8&qid=1327352858&sr=8-1>

**Note**: This book isn’t set to be released until Feb 28th, but Amazon’s Preview feature allows access to a large portion of it.

Overview: Habits utilize routines that we do without actively thinking about them. This is efficient in that it frees up brain power to focus on other things. In fact, people with damage to their basal ganglia (seat of habit formation)

“This process—in which the brain converts a sequence of actions into an automatic routine—is known as ‘chunking,’ and it’s at the root of how habits form.”

“Habits…emerge because the brain is contantly looking for ways to save effort. Left to its own devices, the brain will try to make almost any routine into a habit, because habits allow our minds to ramp down more often.” (p 17)

Efficient brain: requires less room -> smaller head -> easier childbirth; allows us to stop thinking about basic behaviors like walking, so we can devote mental energy to things like inventing spears.

“But conserving mental effort is tricky, because if our brains power down at the wrong moment, we might fail to notice something important, such as a predator hiding in the bushes….So our basal ganglia have devised a clever system to determine when to let habits take over. It’s something that happens whenever a chunk of behavior starts or ends.”

Brain spends a lot of effort at the beginning of a habit looking for a cue that offers a hint as to which pattern to use. At end of pattern, when reward appears, the brain shakes itself awake and makes sure everything unfolded as expected.

Three Step Loop: Cue -> Routine -> Reward , which becomes more and more automatic.

Learning about the cue-routine-reward loop, greatly affects the ability to form new habits. Therefore this is good information to teach at the beginning of a workshop/rationality camp, if you want the participants to form habits.

**Critique**: This would be one of my higher recommendations to actually read. It isn’t a primary source, but is a pop non-fiction book that covers many other case studies. It is easily readable, and very entertaining (which is always a plus.) It seems to be very well-researched. His reference list is 60 pages long, and directs you to the exact sentence he utilized the reference for, as well as often providing personal notes about the works in question.

**Take-Away**:

\*Note\*- Because this is a pop-psych book, I give less weight to the takeaways that are found therein. However, the sources are well documented, so if there is interest in a particular takeaway, I’m sure I can track down the original study.

Utilize cues and rewards when attempting to form a new habit.

Duhigg mentions that studies have shown that learning about the cue-habit-reward cycle actually leads to greater success in habit formation. Therefore, teaching students a quick course on habit-formation would be useful, before they actually attempted habit change.

Duhigg mentions that it is easier to modify an existing cue-habit-reward loop than to attempt to create a brand new one. Therefore, when attempting habit formation, see if there is a current habit that you can tack your new habit onto.

**Reviews**: There are a handful of reviews that provide pretty decent overviews of parts of the book.

### -“How Companies Learn your Secrets” -The New York Times

**Citation**: Duhigg, C. (2012, Feb 19). How Companies Learn your Secrets. *The New York Times*. Pp MM30. Retrieved from: <http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?_r=2>

**Overview**: I actually got this article off a LessWrong discussion post, so you’ve probably already seen it. It’s a good overview of the book, and also includes stories that aren’t available in the Amazon preview of the book. The article focuses on Pole, an analyst who among other things designed an algorithm to figure out when women are pregnant, based on what they buy. (because during pregnancy buying habits are in flux.) He states:

““Just wait. We’ll be sending you coupons for things you want before you even know you want them.”

One important point they mention is:

“Experiments have shown that most cues fit into one of five categories: location, time, emotional state, other peopl1e or the immediately preceding action.”

## A New Look at Habits and the Habit-Goal Interface

**Citation**: Wood, W., & Neal, D. T. (2007). A New Look at Habits and the Habit-Goal Interface. *Psychological Review*, Vol. 114, No 4, 843-863. Retrieved from: <http://www.apa.org/pubs/journals/features/rev-1144843.pdf>

**Abstract**: The present model outlines the mechanisms underlying habitual control of responding and the ways in which habits interface with goals. Habits emerge from the gradual learning of associations between responses and the features of performance contexts that have historically covaried with them (e.g., physical settings, preceding actions). Once a habit is formed, perception of contexts triggers the associated response without a mediating goal. Nonetheless, habits interface with goals. Constraining this interface, habit associations accrue slowly and do not shift appreciably with current goal states or infrequent counterhabitual responses. Given these constraints, goals can (a) direct habits by motivating repetition that leads to habit formation and by promoting exposure to cues that trigger habits, (b) be inferred from habits, and (c) interact with habits in ways that preserve the learned habit associations. Finally, the authors outline the implications of the model for habit change, especially for the self regulation of habit cuing.

**Critique:** This review article focused primarily on the automaticity of habits (i.e. how they occur without conscious thought.) Most points covered in this article are covered more clearly and in Plain English in the pop-sci book “The Power of Habit”. However, this review did have a useful section entitled “Interventions of Habit-Change”, overview below:

**Overview of sub-section “Interventions of Habit-Change”**: Habits can be changed downstream of the cue (the cue occurs and the willpower is used to not engage in habit) or upstream of the cue (the cue is avoided or otherwise set to not occur)

Changing a habit downstream of a cue requires large amounts of self-control, and is generally not sustainable. However a shorter burst of self-control (i.e. a month) might allow for a new habit to over-write the old habit. For example, doing Activity Y rather than Activity X when the cue occurs.

Changing a habit upstream of a cue results in not having to fight the habitual response, but instead it just pushes the mindfulness and self-control back a step. Now instead of having to be mindful to not engage in a habit, there must be constant mindfulness in regards to avoiding cues. One way around these struggles is to allow larger life changes to be opportunities to gain new habits:

“An alternative to effortful, deliberate control of cue exposure is provided by serendipitous changes in performance contexts that occur naturally as a function of life events...[In a] study of students transferring to a new university, when the transfer involved change in the cues that triggered habits, habit performance was disrupted, and students’ responses came under the control of their behavioral goals instead of their habits…

[Researchers] proposed that naturally occurring changes in performance contexts such as moving houses or changing jobs can be treated as opportunities for habit change interventions. If people are best able to act on their goals when related habits are disrupted, then it is during these times that people’s overt responses are most likely to be vulnerable to change through persuasive messages and other informational interventions. The logic is to apply behavior change interventions when people are best able to respond.”

**Take-Away**: Times like Rationality Boot Camps and Mini-Camps are a great opportunity to change habitual behaviors. Being in a completely new setting for a significant period means that you will not be around your usual habit cues, and can therefore mindfully create new cue-habit-reward loops. By the time you go back to your everyday life, the new loop will already be in place, and it will be much easier than trying to create the new loop while fighting the old loop.

Outside of rationality camps, when one wants to change their habits and doesn’t want to wait for serendipitous timing of life changes, then one can induce new settings and environments to help create those changes. An extreme example of this would be moving to a new city, either temporarily (take a month off work) or permanently. More minor examples could be: switching jobs, changing universities, or moving apartments. Of course, the life change must be related to the desired habit change. For example switching jobs might help you re-write work-related habits, but would probably not help with diet related habits. As this is an extreme action, I would recommend it only for extremely dangerous or helpful habits (i.e. addictions, depression, lack of motivation).

## Running Head: Construals and Prospective Self-Control—Promoting Prospective Self-Control through Abstraction

**Citation**: Fujita, K., & Roberts, J. C. (2011). Promoting Prospective Self-Control through Abstraction. *Journal of Experimental Social Psychology.* Retrieved from: <http://faculty.psy.ohio-state.edu/fujita/docs/Fujita-Roberts_(in%20press).pdf>

**Abstract**: When people anticipate that future temptations may undermine valued goals, they use a number of prospective self-control strategies (or “precommitment devices”) to increase the likelihood of future self-control success. Little is known, however, about the conditions under which people are more or less likely to use them. Drawing from construal level theory (e.g., Trope & Liberman, 2003), we argue that people are more likely to engage in prospective self control when they construe events more abstractly (at higher-level construals). Results from two experiments demonstrated that higher-level construals promote use of two well-documented prospective strategies: choice bracketing and self-imposing punishment. Higher-level construals thus appear to enhance people’s efforts to protect their valued goals from anticipated temptations.

**Overview**: “Higher-Level Construal” means thinking in a way such as seeing the forest instead of the trees, looking at why you want to meet your goals rather than how you are going to, looking at larger groupings of things (mammals) rather than more specific groupings (koala).

Fujita and Roberts ran two experiments that showed that higher-level construal led to utilizing pre-commitment devices more strongly. For example, participants who were induced to a higher-level of construal were more likely to use choice bracketing (similar TDT, where a single choice affects future choices), and were willing to have higher levels of self-imposed punishment (i.e. how much money will you volunteer to pay if you miss the appointment.).

This affect only occurred when the participants were acting towards a goal they personally felt was important. Actions protecting unimportant goals were unaffected by level of construal.

**Take-Away:** Iff you value the goal you are working towards, going into a higher-level construal mindframe will raise your likelihood to set up prospective self-control (i.e. things you can do now that will affect your future decisions; Example- Odysseus tying himself to the mast in order to not succumb to the Sirens.). If you think setting up a stickk.com account, or making a public announcement would be useful in maintaining your habit, then going into a high-level construal mindframe will make you more likely to do those actions.

If you want participants in your workshops/camps to engage in prospective self-control, first put them in a higher-level construal mindframe. One good way to do this is by iteratively asking WHY they want to meet their goals. Example:

-Why do you want to maintain a healthy lifestyle?  
 -So that I don’t get sick.  
 -Why do you want to not get sick?  
 - Because it makes me less productive.  
 -Why do you want to be productive?  
 -….etc.

After running this exercise, participants will be more willing to engage in prospective self-control measures (iff they care about the goal they are working toward). For example, they will be more willing to:  
 -Throw away items that would be a detriment to their goal (junk food, video game accounts)  
 -Set up a stickk.com account that will donate their money if they do not maintain their habit.  
 -Set up methods to enforce desired habit. (i.e. if they want to start the habit of not checking facebook during the day, then they would be more willing to install a program that would block facebook during specific hours)

**Review:**

### -How to Improve Your Self-Control

**Citation**: J Dean. (2008, Sept 30). How to Improve Your Self-Control. [web log- PsyBlog]. Retrieved from: <http://www.spring.org.uk/2008/09/how-to-improve-your-self-control.php#improve>

**Overview/Critique**: This blog post review is a readable overview of a number of Fujita’s studies on construal levels and self-control. It covers more than just the one study I cited above.

*Based on new research, along with studies conducted over the past few decades, Dr Fujita and colleagues have proposed that abstract thinking and psychological distance are particularly important in self-control…Their hunch was that thinking from a more abstract, high-level perspective increases self-control…*

*People in the high-level construal condition were consistently:*

* *More likely to avoid the temptation of instant gratification.*
* *Prepared to make a greater investment to learn more about their health status.*
* *Less likely to evaluate temptations like beer and television positively…*

*Fujita’s studies…suggest that self-control can be increased by these related ways of thinking:*

* ***Global processing****. This means trying to focus on the wood rather than the trees: seeing the big picture and our specific actions as just one part of a major plan or purpose. For example, someone trying to eat healthily should focus on the ultimate goal and how each individual decision about what to eat contributes (or detracts) from that goal.*
* ***Abstract reasoning****. This means trying to avoid considering the specific details of the situation at hand in favour of thinking about how actions fit into an overall framework - being philosophical. Someone trying to add more self-control to their exercise regime might try to think less about the details of the exercise, and instead focus on an abstract vision of the ideal physical self, or how exercise provides a time to re-connect mind and body.*
* ***High-level categorisation****. This means thinking about high-level concepts rather than specific instances. Any long-term project, whether in business, academia or elsewhere can easily get bogged down by focusing too much on the minutiae of everyday processes and forgetting the ultimate goal. Categorising tasks or project stages conceptually may help an individual or group maintain their focus and achieve greater self-discipline.*

## Habits as Knowledge Structures: Automaticity in Goal-Directed Behavior

**Citation**: Aarts, H., , & Dijksterhuis, A. (2000). Habits as Knowledge Structures:Automaticity in goal-directed behavior.*Journal of Personality and Social Psychology*, *78*(1), 53-63. doi:10.1037/0022-3514.78.1.53 . Retrieved from: <http://goallab.nl/publications/documents/Aarts,%20Dijksterhuis%20(2000)%20-%20habits%20as%20knowlegde%20structures.pdf>

**Abstract**: This study tested the idea of habits as a form of goal-directed automatic behavior. Expanding on the idea that habits are mentally represented as associations between goals and actions, it was proposed that goals are capable of activating the habitual action. More specific, when habits are established (e.g., frequent cycling to the university), the very activation of the goal to act (e.g., having to attend lectures at the university) automatically evokes the habitual response (e.g., bicycle). Indeed, it was tested and confirmed that, when behavior is habitual, behavioral responses are activated automatically. In addition, the results of 3 experiments indicated that (a) the automaticity in habits is conditional on the presence of an active goal (cf. goal-dependent automaticity; J. A. Bargh, 1989), supporting the idea that habits are mentally represented as goal-action links, and (b) the formation of implementation intentions (i.e., the creation of a strong mental link between a goal and action) may simulate goal-directed automaticity in habits.

**Critique**: This piece is highly cited, but extremely dense read. (Honestly, I skimmed it, and didn’t get a chance for a better read with a write-up before the due date. But I didn’t want to leave it completely out, due to its citation levels.)

## TEDxAlAin: Why creating supportive habits is the best way to obtain your goals

**DO NOT RECOMMEND!**

**Citation**: Grunberg, M. (2011). Why creating supportive habits is the best way to obtain your goals. TEDxAlAin. Retrieved from: <http://youtu.be/ThjFnvEENRw> .

**Overview**: TEDx talk given by Martin Grunberg, author of The Habit Factor.

If you want to meet your goals, the best way to do it is to develop habits towards them. (An interesting reverse of the usual “if you want to maintain habits, the best way to do it is to focus on goals.”)

Interesting Insight: Habit drives practices from the cognitive part of brain (higher order thought) to the limbic system (instinctual thought). This is gone into in more detail in other studies, though.

**Critique**: This is weak anecdotal evidence, mainly from his personal life stories. He also has a tendency towards “woo” (i.e. Look at all these spirals in nature…Energy has a disposition towards pattern and rhythm, and we are energy…), and “wise-sounding” word play. DO NOT RECOMMEND AS SOURCE!

# Citations

**All in one place! In APA format! Wheeeee!**

Aarts, H., , & Dijksterhuis, A. (2000). Habits as Knowledge Structures: Automaticity in goal-directed behavior.*Journal of Personality and Social Psychology*, *78*(1), 53-63. doi:10.1037/0022-3514.78.1.53 . Retrieved from: <http://goallab.nl/publications/documents/Aarts,%20Dijksterhuis%20(2000)%20-%20habits%20as%20knowlegde%20structures.pdf>

C Jarret. (2010, Oct 6). How to Form a Habit. [web log- The British Psychological Society’s Research Digest]. Retrieved from: <http://bps-research-digest.blogspot.com/2010/10/how-to-form-habit.html>

Duhigg, C. (2012). *The Power of Habit: Why we do what we do in life and business*. New York, NY: Random House. Retrieved from: <http://www.amazon.com/Power-Habit-What-Life-Business/dp/1400069289/ref=sr_1_1?ie=UTF8&qid=1327352858&sr=8-1>

Duhigg, C. (2012, Feb 19). How Companies Learn your Secrets. *The New York Times*. Pp MM30. Retrieved from: <http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?_r=2>

Fujita, K., & Roberts, J. C. (2011). Promoting Prospective Self-Control through Abstraction. *Journal of Experimental Social Psychology.* Retrieved from: <http://faculty.psy.ohio-state.edu/fujita/docs/Fujita-Roberts_(in%20press).pdf>

Gardner, B., Abraham, C., Lally, P., , & Bruijn, G. (2012). ‘The Habitual Use of the Self-report Habit Index’: A Reply. *Annals of Behavioral Medicine*,*43*(1), 141 - 142. doi:10.1007/s12160-011-9317-6

Grunberg, M. (2011). Why creating supportive habits is the best way to obtain your goals. TEDxAlAin. Retrieved from: <http://youtu.be/ThjFnvEENRw> .

J Dean. (2009, Sept 21). How Long to Form a Habit. [web log- PsyBlog] Retrieved from: <http://www.spring.org.uk/2009/09/how-long-to-form-a-habit.php>

J Dean. (2008, Sept 30). How to Improve Your Self-Control. [web log- PsyBlog]. Retrieved from: <http://www.spring.org.uk/2008/09/how-to-improve-your-self-control.php#improve>

Lally, P. (2010). How are Habits formed: Modelling Habit Formation in the Real World. *European Journal of Social Psychology*, 40. p 998-1009.

Neal, D. T., Wood, W., & Quinn, J. M. (2006). Habits—A Repeat Performance. *Current Directions In Psychological Science (Wiley-Blackwell)*,*15*(4), 198-202. doi:130.1111/j.1467-8721.2006.00435.x

Neal, D. T., Wood, W., Labrecque, J. S., & Lally, P. (2012). How do habits guide behavior? Perceived and actual triggers of habits in daily life. *Journal Of Experimental Social Psychology*, *48*(2), 492-498. doi:10.1016/j.jesp.2011.10.011

Sniehotta, F. F., , & Presseau, J. (2012). The Habitual Use of the Self-report Habit Index. *Annals of Behavioral Medicine*, *43*(1), 139 - 140. doi:10.1007/s12160-011-9305-x

Wood, W., & Neal, D. T. (2007). A New Look at Habits and the Habit-Goal Interface. *Psychological Review*, Vol. 114, No 4, 843-863. Retrieved from: <http://www.apa.org/pubs/journals/features/rev-1144843.pdf>