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A definition of habit for socio-economics

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ABSTRACT

The paper argues that it is a mistake to define habit as behaviour or action; as a regular conjunction of actions; as a stock; as a form of automaticity (although habit is acquired and activated automatically); as a tendency, propensity or disposition (even though habit acts tendentially); as a mechanism; and as a process (even though habit is acquired and activated via several processes). A taxonomic definition is provided wherein habit is a cognitive representation of a cue-action response.

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KEYWORDS Habit; psychology; cognition; representation

1. Introduction

Whilst the disciplines of economics and habit psychology[1] contain (at least) eight definitions of habit, all but one of them are mistaken – or so I will argue. Indeed, I will work my way through all eight definitions, eliminating the mistaken ones, and ending up with what Hodgson (2018) calls a 'taxonomic definition'. What makes this valuable, is that a scientific community (such as that of socio-economists) requires a taxonomic definition as a prelude to carrying out, and evaluating, theory and research.[2]

The terrain of habit is not easy for economists to tread because it means familiarising ourselves with psychological terms and concepts that we are not, typically, *au fait* with.[3] Indeed, I will not take everything habit psychologists have to say uncritically and, moreover, I will deploy insights from other disciplines.

Whilst in economics the term 'habit' appears, different definitions of habit reflect different conceptions of human agents, built into different schools of economic thought. Two such conceptions stand out. Some schools are built

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[1] References to 'habit psychology' is a shorthand and includes appropriate cognitive and neurosciences.
[2] Maréchal (2010, section 3, 2009, pp. 77–80) attempt something similar.
[3] A small number of economists are, of course, *au fait* with psychology – e.g. Brown (2013).

upon *Rational Economic Man* (REM). Other schools are built upon the *Socially Embedded Individual* (SEI). Whilst the SEI is conceived of as sometimes deliberating, and calculating, and cognising and acting consciously, the SEI is also conceived of as cognising and acting *unconsciously* or automatically (Davis 2003, 2011, Hodgson 2013, chapter 1).

The paper has four sections and a conclusion. Section 2 deals with some caveats and introduces key terms. Section 3 identifies three definitions of habit found in schools of economic thought built upon REM – i.e. habit as action;[4] as the regular conjunction of past and current action; and as a stock. I will argue that each of these definitions are mistaken. Section 4 identifies five definitions of habit found, not only in schools of economic thought built upon the SEI, but also in habit psychology, namely: habit as a cognitive representation of cue-action associations; as a mechanism; as a disposition or tendency; as a form of automaticity; and as a process. I will argue that all but the first of these definitions are mistaken. The conclusion presents a taxonomic definition of habit before adding a note on future research.

2. Some caveats and terms

2.1. Defining definition

Hodgson (2018) argues that a scientific community requires a definition as a prelude to carrying out, and evaluating, theory and research, and the kind of definition needed to accomplish this is a *taxonomic* definition – i.e. one that identifies the minimum number of properties sufficient to demarcate the class of habits from classes of other phenomena, such as stereotypes or norms. According to Hodgson, taxonomic definitions can be formed from six main sub-types, of which I will mention four,[5] presented in the context of habit.

A *lexical* definition is based upon the customary or dictionary meaning of the term 'habit' found, in this context, in comments by economists and psychologists.

A *stipulative* definition is based upon establishing one's own meaning. Some degree of stipulation is necessary in order to carry out remedial work on lexical definitions. Sometimes this involves the addition of concepts found outside psychology, and sometimes the addition of my own insights.

A *nominal* definition has several facets. It depends upon the meaning of terms, clarifying how they can, and cannot, be used; it involves a process of naming; the categories we use to construct it are those we find convenient; the warrant for any particular definition is pragmatic; and it is something researchers impose upon the world, irrespective of the way the world is.

[4] Where possible I use the term action, in preference to behaviour and practice.
[5] I leave aside intensionality and extensionality.

A *real*, or *essential*, definition identifies some of the essential features that make an entity the kind of entity it is – e.g. water is H_2O. A real definition is something the world imposes on researchers, as it were, so it represents the way the world is.

I have a slightly different 'take' on the distinction between real and nominal definitions, but this is not the place to discuss it. I do, however, need to explain my use of these terms because the taxonomic definition of habit I advocate is realist. According to Gupta (2015) 'to discover the real definition of a term *X* one needs to investigate the thing or things denoted by *X*; to discover the nominal definition, one needs to investigate the meaning and use of *X*'. Gupta also writes: 'The chemist aims at real definition, whereas the lexicographer aims at nominal definition'. Consider the following statement from Diller (2012): 'A kitten is a young cat'. Read from left to right, this is a real definition because it explains a property essential to all kittens – i.e. a stage of maturity. Read from right to left, this is a nominal definition because it explains the meaning of the term 'young cat' via another term 'kitten'. This merely substitutes one term for, hopefully, a better understood term. An example of a real and nominal definition of habit, respectively, is 'habit is a cognitive representation' and 'habit is a custom'.[6]

Let me end this section with five observations. First, to reject a definition on the grounds that it is mistaken does not prevent it being a real, or a nominal definition: it is simply a mistaken real or nominal definition.

Second, my objective would be made far easier if a canonical text existed, identifying carefully crafted phrases, explicitly intended to be definitions of habit. No such text exists. Most lexical definitions take the form of passing comments where phrases like 'habit is an x' appears in a sentence not specifically intended to be a definition. This leaves me with a dilemma. If I present a passing comment, and claim it is a lexical definition, a critic can refute this by denying that it is intended as a definition. But, given that such passing comments are often all there is, if I do not use them I cannot present any definitions whatsoever. To recognise that many lexical definitions are passing comments I add the prefix 'proto' and refer to 'proto-lexical' definitions – henceforth ^{pl}definitions. These ^{pl}definitions of habit range from 'weak' to 'strong', but even 'weak' ones must be used because they constitute the raw material for all definitional work.

Third, the literature of habit psychology is littered with inconsistency (a) between researchers, illustrated by the mere fact of different ^{pl}definitions; and (b) within researchers, illustrated by the fact that the same researcher can offer different ^{pl}definitions. I exemplify this via the work of two of the leaders in the field. In Verplanken's (2018) own chapter, a habit is a memory-based propensity and is a memory-based cognitive associative entity, yet

[6] See Mantzavinos (2006) for a totally different interpretation of definition.

when writing with Rebar and colleagues (2018) in another chapter, habits are processes. Verplanken's definitions also shift depending upon whether he is writing with Orbell, Melkevik, or Darnton and colleagues. Gardner has defined habit as a type of behaviour (Gardner *et al.* 2011), a form of automaticity (Gardner 2012), and a process (Gardner 2015b). I raise this matter not to point the finger at these two researchers but to show that most researchers in the field have not attended to the inconsistencies in their positions, indeed, I do not think most are even aware of them – with notable exceptions such as Gardner.

Fourth, a taxonomic definition of habit should not be confused or conflated with accounts of habit that *describe*, *explain*, *or depict* the way habit is acquired and activated.[7] I will return to this important point in Section 4.5.

Fifth, a taxonomic definition should be parsimonious, ideally of the form 'habit is an x', without additional information that would transform it into a description, explanation or depiction.

2.2. Simple and complex habits

Habit psychology is dominated by empirical research on individuals, albeit, individuals often acting with others – e.g. eating, drinking, going to the gym, reading newspapers, watching television and so on. To cite one oft-used example, when people go to the cinema, they often (habitually) buy popcorn (Wood and Rünger 2016, p. 292). Indeed, I will use the 'cinema-popcorn habit' as an exemplar throughout the paper. Some economists might be concerned by this, not only because of its focus on the individual, but also because they are interested in more complex socio-economic actions – e.g. habits in commuting, voting, energy use, consumption, or habits in the workplace, job-seeking and so on. Allow me to alleviate these concerns.

Only individuals can acquire habits which are located in their individual procedural memories – i.e. *you* cannot acquire *my* habits and there is no Borg-like collective memory.[8] But, habit acquisition requires individuals to engage in regular or repeated action, and this is often the result of them being enabled or constrained by social structures or institutions. This is relatively well known. Socio-economists often refer to the 'reconstitutive downward effect' of structures or institutions (Hodgson 2011). Psychologists often refer to mind being 'scaffolded' by environmental or cultural structures (Garcia-Marques and Ferreira 2009).

But, habits are often said to be complex. There is no consensus on the use of the term, but two recent contributions should suffice to explain it. For

[7] For example, Foerde (2018, p. 17) lists a set of attributes that, she suggests, define the habit construct. See Gardner (2015a, pp. 278–280) for a useful comment on definitions in the context of habit.

[8] On memory see Sutton (2010).

Gardner, and colleagues, complex actions are those that feature a greater number of psychologically meaningful sub-actions, and so are more cognitively effortful to perform to completion. Most actions can be broken down into sub-components such that actions are composed of lower-level, subservient sub-actions. For example, 'eating popcorn when watching a movie' may be decomposed into 'entering the cinema', which can be further decomposed into 'pushing open the cinema door', 'purchasing a cinema ticket', and so on.[9] These individual actions are 'chunked' into a coherent, integrated whole action in procedural memory. Gardner *et al.* (2016) and Gardner and Lally (2018) conceive of this as involving the selection of action, involving the activation of a cognitive representation; and performance, involving the unfolding and eventual termination of a sequence of sub-actions. They refer to these two action stages as 'habitual *instigation*' and 'habitual *execution*' respectively. Habitual instigation seems to operate as an automated reminder to act, obviating the need for external reminders. Habitual execution makes procedural enactment smooth and efficient, allowing agents to attend to matters unrelated to ongoing actions executed automatically (Gardner *et al.* 2016, p. 617). See also Marien *et al.* (2018, pp. 57–58).

Mullan and Novoradovskaya's (2018, *circa* 739) notion of complexity is slightly different. They offer a taxonomy based upon the number of steps in a behavioural sequence; and the outcome of the behaviour, apropos immediate *hedonic* benefit to *distal* benefit. They create what we might call four 'ideal types': one-step hedonic behaviours (e.g. consuming sugar-sweetened beverages); multi-step hedonic behaviours (e.g. using reusable drink containers); one-step distal benefit behaviours (taking supplements); and multi-step distal benefit behaviours (e.g. recycling).

In sum, because the acquisition and activation of all habits, simple or complex, involves similar processes, there is no problem explaining habits via a simple cinema-popcorn habit. Indeed, it allows us to keep the focus on explaining these processes, without getting distracted by more complex examples.

2.3. Context cue

Whilst there is widespread agreement that cues trigger, or activate habit, there is little agreement on what constitute cues. Indeed, sometimes they are referred to as 'stimuli', and sometimes context is run together with 'cues', as in 'context cues'. Identifying context cues that apply broadly is much simpler for some behaviours (e.g. teeth brushing) than others (e.g. smoking) (Labrecque and Wood 2015, pp. 306–307). In experimental conditions, the cue is always something very specific such as a sound, that triggers a very specific action such

[9] Gardner and Tang (2013, pp. 267–268) note the subjective element in the way people interpret the meaning of an ostensibly identical action. For example, participants in their study variously interpreted 'commuting' to begin when leaving home, when waiting for a bus or train, or when aboard the vehicle.

as a button press which, in turn, triggers a very specific outcome such as the illumination of a light. Outside of the laboratory, the context cue involved in habit acquisition and activation is often 'fuzzy' – e.g. 'being in a bar' (Mazar and Wood 2018, p. 18), or 'being 08:00 on a weekday' (Rhodes and Rebar 2018, p. 92). Even the relatively simple cinema-popcorn habit does not actually involve a simple action (e.g. entering cinema, and buying popcorn), but a series of actions, such as pushing open the cinema door, walking into the lobby, waiting in a queue, smelling the popcorn, requesting and receiving a cinema ticket, asking for the popcorn, handing over the money and so on. In some cases, the cue is the context, hence context cue, and could be a place, a time, a situation, a physical location, other people, a mood, and so on. The habitual action of commuting to work using the car, for example, could be activated by it being 08.00 hours on a workday (e.g. not 10.00 on a non-workday).

2.4. Cognition

Much psychology is rooted in the Classical View of Cognition wherein the 'mind is basically an intracranial information processing system manipulating (sub)symbolic representations; cognition essentially is this computational process' (De Bruin and Kästner 2012, p. 542). On this view, the locus of action is the brain, essentially a computer, which encodes incoming information as representations (i.e. mini-replicas, or pictures, of external objects or events, symbols, sub-symbols, schemas and rules) then issues a set of instructions to a passive body which executes them. More recently, Phenomenologically oriented alternatives have emerged wherein the locus of action is not just the brain. Rather, as 'beings-in-the-world' our cognition is *embodied* (i.e. involving the body); *extended, distributed or embedded* (i.e. into or in the external environment); *enacted* or *situated* (i.e. involving practical activities); *anticipatory* (i.e. involving forward looking and pre-prepared); and *dynamic* (i.e. continually adapting to changes in the external environment).[10]

Moreover, the kind of habitual action we are interested in is *social* action. This involves far more than mere bodily movements because it requires agents to interpret,[11] or 'read' situations, the actions of other agents, and to know how to engage with phenomena like rules. Thus, an agent with a cinema-popcorn habit has to do a great deal of interpretive work between entering the cinema and watching the film munching her popcorn. Nevertheless, without cognitive, neurological, and bodily action, along with social and interpretive action, the appropriate neural changes necessary for the acquisition and activation of habit could not occur.

[10] This is understood by Hodgson (2004a, p. 175). See Gallagher and Crisafi's (2009) work on 'mental institutions'. See also Fleetwood (2019).

[11] I am tempted to use the term 'hermeneutic' but will stick solely with 'interpretative' in case this is misunderstood as a commitment to a hermeneutic philosophy more widely.

2.5. Representations

Whilst I am going to argue that habit is a cognitive representation, I am perfectly aware that this is a highly contested term. There are, speaking very broadly, three main 'positions' *apropos* representation. For those operating in the Classical paradigm, representations (as sketched above) exist. For those operating in the Phenomenological paradigm representations do not exist, indeed, they are unnecessary. Beings-in-the-world get everything they need to guide their action from the world, so there is no need for something called 'representations' to perform the guiding function. Then there are those who reject the Classical paradigm, accept a great deal of the Phenomenological paradigm, but draw a line at the claim that human agents get *everything* they need to guide their action from the world. For those operating from this position, representations are believed to exist. This position is illustrated in the work of De Bruin and Kästner (2012, pp. 549–550) who adopt a 'weaker reading' – i.e. a representation can be any kind of stand-in for another item. This is the position that I will take throughout this paper.[12]

Incidentally, to argue, as I will, that habits are cognitive representations, means they are located in agents' cognitive systems (broadly conceived, more specifically, in procedural memory.

2.6. (Un)consciousness and automaticity

Consciousness and unconsciousness are not dichotomous states but exist on a continuum from *completely* conscious to *completely* unconscious.[13] A cognitive process, such as that involved in habit, is said to be relatively (un)conscious when the agent is relatively (un)conscious of (a) the stimulus input that evokes a process, (b) the output of a process, (c) the process or its constituent steps, or (d) the consequences of a process (Moors and De Houwer 2006, pp. 312–314). Cognising and acting unconsciously allows us to minimise cognitive load – i.e. the mental effort involved with consciously deliberating and calculating. It is, of course, always possible that an agent realises s/he is acting habitually, and consciously intervenes to suspend, or 'kick' the habit. But, most habit psychologists consider habitual action to be carried out, if not completely unconsciously, then towards that end of the spectrum. 'Most researchers agree that some parts of habitual mechanisms operate outside of awareness' (Marien *et al.* 2018, p. 54).

(Un)consciousness is, however, one of six 'features' of *automaticity* – a term virtually unknown in economics, but widely used in psychology. Thinking is

[12] For an overview of work on representations see Gallagher (2013, 2015) and Gangopadhyay (2011). Clowes and Mendonça (2015) defend a weaker view, and Hutto (2013) takes a radical Phenomenological view.

[13] This is often conceived of in terms of Types 1 and 2 systems of thinking. See Evans and Stanovich (2013, especially table 1) for an overview.

said to be automatic if it is characterised by one, or several, of the following features: it is *uncontrolled*, *unintentional*, *goal dependent*, *purely stimulus driven*, *unconscious*, *efficient or fast*. Automaticity is a contested concept, and 'despite its central nature, there is no consensus about what automaticity means' (Moors and De Houwer 2006, p. 297). Disagreement is, however, less about the existence of automaticity, and more about *inter alia* how agents combine automatic and non-automatic thinking; about how exactly the various features operate; or whether we have to accept the 'all-or-none view' – i.e. if automaticity has no clear set of defining features then it does not exist. In sum, I agree with their conclusion (Moors and De Houwer 2006, p. 321) that the 'term *automaticity* may be kept as an umbrella term' whilst investigators should specify which feature(s) they are dealing with. Contestation notwithstanding, as a matter of fact, automaticity *is* used as a defining feature of habit and henceforth I will use it in preference to the term 'unconscious'. For most habit psychologists, habits are acquired and activated automatically.[14]

2.7. Approaches to economics

Three points are worth noting. First, I am not dividing economists into non-mainstream and mainstream, but into those operating with SEI and REM. Second, there are many versions of REM, and some versions are augmented by including *inter alia* bounded rationality, informational limitations, and uncertainty. Yet, one particular characteristic is important in the context of habit. All of REM's *cognising and acting is assumed to be deliberative*, *calculative*, *and carried out consciously or non-automatically*. When I refer to REM, I am referring specifically to this characteristic. Third, given that I am working on the cusp of economics and psychology, why not discuss behavioural economics (BE), experimental economics (EE), and neuroeconomics (NE)?[15] There are two related reasons. First, the topic of habit is not widely discussed in BE, EE and NE. Second, whilst different versions of REM appear in BE, EE and NE, all three have a conception of agents who cognise and act consciously, or non-automatically. For example, Brette *et al.* (2014, p. 405) concur: 'The various approaches in neuroeconomics (in spite of significant discrepancies) are primarily interested in studying choice behaviour'. If, however, someone operating under the rubric of BE, EE and NE should opt to investigate habit using a conception of agents who cognise and act unconsciously or automatically this would not present a problem for my categorisation: I would simply place them in the SEI camp.[16]

[14] See reviews by Ferguson and Bargh (2004), Bargh *et al.* (2012), Moors and De Houwer (2006) and Moors (2016). Baumeister *et al.* (2011) offer a wide-ranging discussion of conscious and unconscious thinking; Ashby *et al.* (2010) discuss automaticity in cognitive science; and De Bruijn *et al.* (2014) discuss automaticity in habit psychology.

[15] I thank an anonymous reviewer for drawing my attention to this omission.

[16] For a sample of recent research on BE, EE and NE that supports my contention see: Best *et al.* (2012), Brocas and Carrillo (2014), Camerer (2008), Cobb-Clark *et al.* (2014), Carbonea and Duffy (2014), Damasio

2.8. Habit of thought or habit of action

The term 'habit of thought' (and variants like 'habit of mind') crop up in economics and psychology. Habits of thought are different to habits of action because when a habit of thought is activated, it tends to bring about another thought, not another action. As Hodgson (2010, p. 11) observes 'government health warnings and medical advice may change our habit of thought, from regarding alcohol as enjoyable to its perception as a dangerous drug'. Whilst habits of action are widely discussed, habits of thought are not. I will be dealing only with habits of action.[17]

3. REM-based economics and the definitions of habit

In this section I will present three [pl]definitions of habit found in schools of economic thought built upon REM, namely, habit as action; as the regular conjunction of past and current action; and as a stock. I will argue that each one is mistaken.

3.1. Habit as action

The first [pl]definition of habit as behaviour, practice or action is not exclusive to REM-based economics, and appears in dictionary entries, sociology and psychology – as the following comments illustrate

> Habit formation is a well-documented behavioural regularity in psychology and behavioural economics. (Leventoğlu 2017, p. 477)
>
> First, some definitions. I am going to use the term 'habits' to refer to practices that are recurrently and consistently reproduced by suitably committed practitioners. (Shove 2012, p. 103)
>
> *Habit* is a settled tendency or practice. (*Oxford Dictionary* 10th ed 2000)
>
> [A] 'habit' . . . is a behaviour that is under the control of S–R mechanisms . . . . [A] habit is a behaviour that is elicited by environmental stimuli to which it has become strongly tied . . . [H]abits are behaviours. (Ashby *et al.* 2010, p. 209)
>
> [Habits are] considered to be situationally guided goal directed behaviours, and hence, behavioural responses. (Holland *et al.* 2006, p. 776)
>
> The historical definition of habits is that they are behaviours rooted in SR associations that have been acquired through learning based on reinforcement. (Smith and Graybiel 2016, p. 34)

On these [pl]definitions, habit *is* action; it is what agents do, and what we observe them doing. Unfortunately, there are three problems with this definition. First,

and Damasio (2016), Driscoll and Holden (2014), Konovalov and Krajbich (2019), Ross (2014, chapter 4) and Westbrook and Braver (2015). See Section 3.3 below.

[17] See Verplanken *et al.* (2007) and Verplanken (2018) for discussions of the concept, and Fisher *et al.* (2017) for an application.

it is a straightforward logical mistake, namely, it mixes-up cause and effect: habit cannot be *both* the action, and the cause of that action (Maddux 1997, p. 336). As Rebar *et al.* (2018, p. 31) put it '*Habit* is the process that determines behaviour, and habitual *behaviour* is the output of that process'.[18] Second, reducing habit to action denies a role for cues – e.g. entering the cinema. As will become clear, virtually all contemporary habit psychologists agree that a cue is necessary for habit acquisition and activation. Third, reducing habit to action eliminates the possibility that habit could be anything other than an action, such as a cognitive representation.

Sub-conclusion §1. It is a mistake to define habit as an action.

3.2. Habit as the regular conjunction of past and current actions

In REM-based economics, habit is often [pl]defined as a regular conjunction of a quantity of a good consumed in the past, with the quantity of the *same* good consumed in the present.

> Habit formation is a well-documented behavioural regularity in psychology and behavioural economics. Accordingly, human beings form habits for consumption and their current satisfaction level tends to be highly correlated with their past consumption level. (Leventoğlu 2017, p. 477)

> I define *habitual* behaviour as displaying a positive relation between past and current consumption. (Becker 1992, p. 328)

Habit, then, is a regular conjunction of a quantity of a good (x) consumed in the past, with the quantity of the *same* good (x) consumed in the present or, for brevity, a regular conjunction of actions occurring over time.

There are, however, four problems with this [pl]definition. First, it is merely an extension of the habits as actions definition presented in the previous section. Notice that the comment from Leventoglu appears here and in Section 3.1. Second, (mis)conceiving habit to the mere memory of past actions (which influence present actions) has nothing to do with how habit is conceived by most contemporary habit psychologists. Third, reducing habit to the mere memory of past actions, once again denies a role for cues and, therefore, suffers from the same problem noted in Section 3.1. Fourth, it makes habit entirely dependent upon the existence of a *regular conjunction* of actions occurring over time: *no regular conjunction of actions, no habit*. If, as we will see in Section 4.4 below, habit acts *tendentially*, meaning that we might *not* observe a regular conjunction of actions. The cinema-goer might, for example, have insufficient funds to buy the popcorn, and yet still have the cinema-popcorn habit.

Sub-conclusion §2. It is a mistake to define habit as the regular conjunction of past and present actions.

[18] Incidentally, this misconception cannot be rescued by appeals to the (legitimate) concept *autopoiesis*. See Section 4.5.

3.3. Habit as a stock

Some contemporary REM-based economists include 'deep habit' in their models, especially New Keynesian business cycle models (Givens 2015, p. 1148). Havranek *et al.*'s (2017) meta-analysis cites 81 published studies on habit formation, of which over 70 were published since 2000. Let us pick-out a few salient points from this literature. [19]

The term 'habit' often appears alongside terms like 'preferences', 'tastes', 'formation' and 'persistence'. Schmitt-Grohe and Uribe (2008, p. 814) note that: 'Habit persistence, or "habit formation", in its most common representation, is a preference specification'. Habit is quantified, typically, as a *stock variable*, although Deaton (1999, pp. 16–17) is vague about what this means: this variable 'might represent the stock of durable goods, or more vaguely, a psychological stock of habit or of preference 'capital'. For Ravn *et al.* (2010, p. 317) 'the stock of habit ... is an increasing function of past consumptions'. For Aloui (2013, p. 1660) 'Households that consume a large amount of a particular good today are more likely to buy this kind of good in the future by force of habit'. For Rozen (2010, pp. 1341–1344) an agent's 'intrinsic habit' appears to be his or her 'consumption history'. 'The decision maker's preferences over the space of consumption streams ... depend on her consumption history, her *habit* .... [She] knows that her future tastes will be influenced by her consumption history'. For Rustichini and Siconolfi (2014, pp. 55–56) 'the memory of past consumption experience affects preferences over present and future choices ... With habit formation, present and past consumption choices affect the habit stock and, hence, the preferences over continuation paths'.

All this is highly ambiguous, so allow me to present my interpretation. Habit *could* be defined, as a preference. Apart from the fact that it is unclear what exactly this means, it misses an important point. 'Crucially, our habits help to make up our preferences and dispositions. When new habits are acquired or existing habits change, then our preferences alter' (Hodgson 2004b, p. 656). Habit *could* be defined as the regular conjunction of past and current actions, à la Becker. But, it makes more sense (from this perspective) to define it as a 'psychological stock' encoded in *memory*. Chetty and Szeidl (2016, p. 855) state, explicitly, that 'habit stock is a weighted average of past consumption'. This memory of past consumption then affects 'the preferences over continuation paths' and, thereby, future consumption. Henceforth, I will refer to this [pl]definition as habit as a stock – i.e. *a stock of past actions*, *located in memory*.

There is a fundamental problem with defining habit as a stock: it has no conception of a cue and is simply a memory of actions taken in the past. As we will see below, even if they disagree on the details, almost all habit psychologists define habit as being acquired and activated by cues. Whilst it may be true that

[19] It is not necessary, here, to differentiate between deep and superficial habits. See Schmitt-Grohe and Uribe (2008) and Aloui (2013, p. 1660). See Crawford (2010) for a more general, theoretical approach.

agents often engage in an action today (e.g. buy product x) because they regularly bought product x in the past, such action is *not habitual action*, *and it is not caused by a habit*. Habit as a stock is not a definition that psychologists would recognise as habit.

Sub-conclusion §3. It is a mistake to define habit as a stock of past actions.

Before leaving this section, I want to raise an important issue. Whilst most REM-based economists assume that REM cognises and acts consciously, virtually all contemporary habit psychologists agree that habit operates unconsciously or automatically. If this is the case, then REM-based economists must either abandon REM, or abandon (what they call) habit. And yet many remain committed to both REM and habit. There appears to be two ways to try and reconcile this contradiction. The first is for REM-based economists to ignore contemporary habit psychology, and claim that habit is conscious, as Becker does.

> [M]any writers have claimed that habitual behaviour is not fully rational . . . [I]t is not obvious to me that they [i.e. habits] are less rational than other preferences. (Becker 1992, p. 331)

> I am claiming in this paper that habitual behaviour does not imply a reluctance to calculate. (Becker 1992, p. 332)

If agents act habitually, but this behaviour does not 'imply a reluctance to calculate', then this behaviour must be calculative and conscious. Habit, or rather habitual action is, thereby, re-jigged to be conscious.[20] Unfortunately, this flies in the face of contemporary habit psychology.

Second, the problem can simply be ignored. REM-based economists routinely refer to habits as actions, as the regular conjunction of past and present actions or as a stock of past actions. Whilst there are occasional mentions of habits being unconscious there is no mention of a contradiction between agents that cognise and act consciously, guided by deliberation and calculation, and agents that do so unconsciously. The contradiction is simply not recognised.

4. SEI-based economics and the definitions of habit

In this section I will present five [pl]definitions of habit found, not only in schools of economic thought built upon SEI, but also found in habit psychology, namely, habit as a cognitive representation of cue-action associations; as a mechanism; as a disposition or tendency; as a form of automaticity; and as a process.[21]

[20] Waller (1988, p. 123) show that the Austrian economist Von Mises does something similar – i.e. 'assert that nonreflective behaviour is reflective'.

[21] I have deliberately not taken a History of Economic Thought approach because returning the work of Pierce, Dewey, Veblen and James, for example, will only take us back into (some of) the eight definitions

> A habit is a disposition to engage in previously adopted or acquired behaviour (including patterns of thought) that is triggered by an appropriate stimulus or context. Habits are influenced by prior activity and have durable, self-sustaining qualities. (Hodgson 2015, p. 269)

> Habits are submerged repertoires of potential behaviour; they can be triggered or reinforced by an appropriate stimulus or context. The meaning of habit adopted by Veblen [and others] was of an acquired proclivity or capacity, which may or may not be actually expressed in current behaviour . . . But if we acquire a habit we do not necessarily use it all the time. It is a propensity to behave in a particular way in a particular class of situations. (Hodgson 2003, p. 652)

> [T]he view of habit here is of a disposition, which, once acquired, is not necessarily realised in any future behaviour. Habit is a causal mechanism. (Hodgson 2010, p. 4)

> In the current psychology literature, habits are defined as 'behavioural dispositions to repeat well-practised actions given recurring circumstances'. Building on this basis, the management and economics literature defines habit as individual-level behavioural tendencies, or 'dispositions to engage in previously adopted or acquired behaviour that is triggered by an appropriate stimulus or context'. By evoking the same action when exposed to the same cue, repeated action creates if-then links between actions and cues such as times, places, and people that are typically present during performance. (Becker and Knudsen 2017, p. 46)

> First, habits . . . are largely learned; in current terminology, they are acquired via experience dependent plasticity. Second, habitual behaviours occur repeatedly over the course of days or years, and they can become remarkably fixed. Third, fully acquired habits are performed almost automatically, virtually nonconsciously, allowing attention to be focused elsewhere. Fourth, habits tend to involve an ordered, structured action sequence that is prone to being elicited by a particular context or stimulus. And finally, habits can comprise cognitive expressions of routine (habits of thought) as well as motor expressions of routine. These characteristics suggest that habits are sequential, repetitive, motor, or cognitive behaviours elicited by external or internal triggers that, once released, can go to completion without constant conscious oversight. (Graybiel, cited in Becker and Knudsen 2017, p. 28)

All five of the sought after [pl]definitions of habit are mentioned in the above comments, let us consider each of them in turn.

4.1. Habit as a cognitive representation

Let us start with [pl]definitions of habit *as* cognitive representations of some kind.

we already have without adding clarity. For this approach see Brette *et al.* (2017), Duroy (2016), Hodgson (1997, 2003, 2004, 2006a, 2006b, 2007), Jackson (2009), Lawson (2015), Maréchal (2009), Rutherford (1999, pp. 51–67), Schwanen *et al.* (2012) and Waller (1988).

> [T]he stimulus response association, that is habit . . . The mental association derived from past stimulus response association is the defining mechanism by which a habit response occurs. (Orbell and Verplanken 2015, p. 312)

> Previous research into the cognitive processes underlying habitual behaviours indicates that *habits are mentally represented as associations*. (Danner *et al.* 2011, p. 190)

> [E]vidence from social cognitive and from neuroscience research converge on the idea that habits are direct context–response associations in memory that develop with repetition. (Wood and Neal 2009, p. 580)

> Habits reflect associative learning and the formation of context-response associations in procedural memory. Once habits form, perception of the context automatically brings the response to mind, and people often carry out that response. (Wood and Rünger 2016, p. 306)

> By definition, habits are representations of stimulus–response links that do not refer to goals, and are in a sense directly elicited by the environmental states or stimuli or contexts. (Robbins and Costa 2017)

> [M]ost modern research begins with a conceptual definition of habits as *cue–response associations in memory that are acquired slowly through repetition of an action in a stable circumstance* . . . [M]ost habit researchers agree on the theoretical definition of habits as automatic cue–response associations. (Mazar and Wood 2018, p. 14)

The following is not actually a definition, but a succinct explanation or description of how habit is acquired and activated, and we need to understand it in order to distil from it a [pl]definition of habit.

> [H]abits are represented in memory as direct context–response associations that develop from repeated coactivation of the context and response. That is, when the mental representation of a response (e.g. buckling seatbelt) is consistently activated in conjunction with representation of a context (e.g. getting into a car), associative links gradually form between the two . . . . The essential mechanism behind direct cuing involves the cognitive neural changes that result from repeated coactivation of responses and contexts. With repetition, incremental changes occur in relevant processors or neural assemblies in procedural memory, essentially tuning the processing elements in ways that facilitate the repeated aspects of responding to recurring features of performance contexts. This gradual development over repeated experience provides a selection mechanism for habit learning because only those patterns that are consistently and frequently repeated will be encoded in procedural memory in the form of habit associations. (Wood and Neal 2007, p. 845, see also Neal *et al.* 2011, p. 1428, Wood and Rünger 2016, p. 294, Mazar and Wood 2018, p. 16)

Habit is acquired via both 'cold' processes (i.e. repetition of past associations between the experience of a cue and an action) and 'hot' processes (i.e. experiencing a reward). As Wood and Rünger (2016, p. 295) put it: 'dopamine signals promote habit learning as people initially repeat responses to a reward. See also Wood and Neal (2007, p. 844) and Carden and Wood (2018, p. 117).

There is, however, disagreement over the extent to which 'hot' processes are involved in habit because (a) dopamine signals become less active with repetition, as the reward recurs (Wood and Rünger 2016, p. 295); (b) habit formation has been observed in the absence of tangible reward; and (c) the performance of an intended action may itself be intrinsically rewarding (Gardner and Lally 2018, p. 217). In recognition of this disagreement I will keep both 'cold' and 'hot' processes in my analysis.

Let me explain how habit is acquired and activated via a simple example of a cinema-popcorn habit. Anna regularly visits the cinema, and almost every time she does, she buys popcorn. Her visits to the cinema, and her actions of buying popcorn were carried out in a relatively stable context – e.g. the cinemas she attended were always local, she always had money to buy popcorn, she never bought chocolate and so on. During the first couple of visits, she made a *non-automatic* (n.b. conscious) decision to buy popcorn because she enjoys the sweet taste. In these early visits, she had not yet acquired the habit. After several more visits, however, she began to buy popcorn *automatically*, virtually every time she entered the cinema – once or twice she did not because she was on a diet. At this point in time she had, automatically, acquired the habit.

Entering the cinema had now become a *cue* and buying popcorn had become a *response* to this cue – i.e. an *action*. Virtually every time she experienced the cue, she engaged in the action. Anna had gradually, and automatically, built up a *cognitive representation* of the associations between the experience of the cue and the action. This cognitive representation formed in her cognitive system, more specifically, in her procedural memory.[22] The more she repeated the process of experiencing the cue, along with engaging in the action, the more this cognitive representation strengthened – up to a point.

Notice that Anna's popcorn purchases were not activated by a cognitive representation of an association between a cue and a reward – i.e. the sweet taste of popcorn. If this were the case the cue-action association would be goal dependent, not fully automatic. Neither was her action activated by the mere fact of her buying popcorn previously, remembering it, and choosing to do so again. The lesson here is that it is necessary to differentiate between *bone fide* habits, and close relatives that also rely on (different types of) cognitive representations such as stereotypes, informal rules or norms (Fleetwood 2019).

> a habit proper is a memory-based cognitive associative entity which includes a history of behavioural repetition. The latter distinguishes habits from other cognitive representations underlying automatic processes, such as schemas, first impressions, norms, or attributions. (Verplanken 2018, p. 4, see also Mazar and Wood 2018, Marien *et al.* 2018)

[22] It is not a contradiction to claim that habit is located in agents' cognitive systems, whilst holding a Phenomenological understanding of cognition as sketched in Section 2.4 above.

Maréchal (2016, p. 218) has spotted this, writing: 'Habits do indeed appear to be something else than just past-dependent as in a traditional approach à la Becker, where they are defined as the influence of past consumption on current consumption'. There is an important lesson here. Not every unconscious or automatic action is habitual action, and some of the things that socio-economists often (mis)take to be habits may turn out to be something else – e.g. stereotypes, norms or informal rules (Fleetwood 2019).

Moreover, if habits are cognitive representations, then they are located in agents' cognitive systems (Section 2.5), more specifically in procedural memory. This makes habit a feature of human agency and not, for example, a feature of social structure or institutions.

> Sub-conclusion §4. Habit is a cognitive representation of a regularly experienced cue and action response, located in procedural memory, acquired automatically via 'hot' and 'cold' processes and activated automatically via the 'cold' experience of a cue.

4.2. Habit as a mechanism

Let us start with some [pl]definitions of habit as a mechanism. For Orbell and Verplanken (2015, p. 312) 'The mental association derived from past stimulus response association is the defining mechanism by which a habit response occurs'. For Wood *et al.* (2005, p. 932) 'research provides insight into the unique mechanisms that regulate habit performance'. Labrecque and Wood (2015, p. 308) refer to 'the mechanisms that actually guide . . . habitual behaviours'. Mazar and Wood (2018, p. 21) refer to 'the habit cue–behaviour mechanism'. These are what I referred to (in Section 2.1) as 'weak' [pl]definitions, although the Institutional economist Hodgson (2010, p. 4) offers a 'stronger' version, writing: 'Habit is a causal mechanism'.

The term 'mechanism', or 'causal mechanism' has two 'sides' to it. First, it is an abstract and general term that 'stands in' for things that we do not know, or do not wish to cite or list. Second, whatever the mechanism is, it acts causally, meaning that is exerts a causal influence on something, or is causally implicated in causing something, either on its own, or (more often) in combination with other mechanisms. This causal influence is almost always tendential – see Section 4.4 below.

To say 'a habit is a mechanism' is to deploy the term 'mechanism' to stand in for, and obviate the need to specifically identify something else, such as a 'mental association derived from past stimulus response association' as Orbell and Verplanken put it above. It also means that the mechanism (e.g. the 'mental association . . . ') is implicated in causing habitual behaviour. Put simply, habit is said to be the mechanism that causes habitual behaviour.

Just to confuse matters, the terms 'habits' and 'mechanisms' can be used in another sense. Habits as mechanisms, are themselves caused by other

mechanisms. As one reviewer put matters 'context-consistent performance is the mechanism by which habit *forms*' (emphasis added). In this context, to form means to cause, or at least to be causally implicated. The same goes for terms like 'to reinforce', and 'to maintain' as in the following comment from Gardner and Tang (2013, p. 259) 'Habitual performance reinforces the context–behaviour link, and so habits are self-sustaining over time. Habit thereby offers a mechanism for behaviour maintenance'. This is quite correct, but it is not how the term is used in the context of saying 'habit is a mechanism'.[23] I am not concerned with this context.

The crux of the matter can now be stated. When we know enough about the mechanism we believe is the habit that we can, for example, say 'habit is a mental association derived from past stimulus response association' then we should say this and avoid the term 'mechanism'. Even if it is sometimes convenient to say 'habit is a mechanism', it is a mistake (although not a serious one) to *define* habit as a mechanism, (a) because we do not need to; and (b) because it confuses matters.

> Sub-conclusion §5. It is a mistake to define habit as a mechanism – although not a serious mistake.

4.3. Habit as a form of automaticity

Let us recall Section 2.6 on automaticity and say: habit is *automatic* if it is uncontrolled, unintentional, goal dependent, purely stimulus driven, unconscious, efficient or fast. Now, let us consider some [pl]definitions of habit *as* a form of automaticity.

> [H]abits should be seen as a form of context-dependent automaticity which, once formed, are not necessarily enacted frequently unless the environmental triggers are frequently experienced ('habit as automaticity, not frequency'). This viewpoint is important for two reasons. First, it views automaticity as the essence of habit and explains the effects of established habit on action through automatic processes. (Gardner 2012, p. 32)[24]

> A habit is a form of automaticity in responding, which develops as a person repeats a particular behaviour in stable circumstances. (Verplanken and Melkevik 2008, p. 16)

> Habit might be usefully characterized as a form of automaticity that involves the association of a cue and a response. (Orbell and Verplanken 2010, p. 374)

> Habits [are] defined here as a form of automaticity. (La Rose 2010, p. 194)

There is a problem. To define habit *as* a form of automaticity is a terminological mistake, or a category mistake – or both. For example:

[23] This resonates with the discussion of processes in Section 4.5 below.

[24] Gardner no longer holds this position, and now defines habit as a process. I leave the comment because, clearly, others have not spotted the evolution in Gardner's thought. See Mazar and Wood (2018) and Marien *et al.* (2018) for comments on various aspects of automaticity in the specific case of habits.

> Gardner *et al.* (2012) argue the mechanism by which habit triggers behaviour is automaticity, which is therefore the 'active ingredient' in the relationship between habit and behaviour. (Rebar *et al.* 2018, p. 40)

Rebar *et al.* can say habit *is* the mechanism, or habit *is* the active ingredient, that triggers behaviour, but they cannot say habit *is* the automaticity that triggers behaviour. The term 'automaticity' should be used as a reference to the way habit is triggered, not as a reference to the habit itself. This is akin to saying something like 'a bicycle is a form of cycling'. Some psychologists are alert to this:

> The terms habit and automaticity are sometimes used interchangeably. Like other automatic responses, habits are activated in memory in an autonomous fashion without requiring executive control. Habits, however, are not synonymous with automaticity but are best understood as learned automatic responses with specific features. (Wood and Rünger 2016, p. 292)

But, it is neither a terminological nor a category mistake to say that habit is acquired and activated automatically, or similar. The term 'automatic' should *not* be used to *define* habit, but it can be used as part of the definition – i.e. to illustrate the way habit is acquired and activated. The following is, arguably, spot on: 'A habit is often conceptualised as a learned response pattern that has become automatic through repetition of the habitual behaviour (Verwijmeren *et al.* 2011, p. 207).

> Sub-conclusion §6. It is a mistake to define habit as a form of automaticity, despite the fact habit is acquired and activated automatically.

Point of clarification. To say that an action is automatic *and* goal dependent seems to be a contradiction, but this is not so. A deliberate goal might have been the initial cause of an agent's action (e.g. buying popcorn), but as time passes this goal becomes devalued. This does not mean that the habitual action is not goal dependent, merely that the goal has ceased to be deliberately pursued. As Verplanken (2018, p. 2) puts it: 'while goals are often at the heart of habit formation, over time they may fade away, and all we are left with is an ingrained propensity to respond in a particular way to a specific cue'. For Corbit (2018, p. 161) 'It is now well established that even for behaviours that may start out as flexible or goal directed, control can shift to a more automatic and relatively goal-insensitive system, that is, these behaviours become habits'.[25]

[25] See Carden and Wood (2018, p. 117), Fishbach and Ferguson (2007, p. 311), Holland *et al.* (2006, p. 776), Marien *et al.* (2018), Wood and Neal (2009, p. 580), Wood and Rünger (2016, p. 307), and Watson and de Wit (2018). My position seeks to reconcile two positions: (i) habit represents a form of goal-directed automaticity (e.g. Aarts and Dijksterhuis (2000), and (ii) habit represents a form of non-goal-directed automaticity (Wood and Neal 2009). The latter define habitual actions as goal-independent, such that any behaviour that arises as a product of the automatic activation of a goal is, by definition, not habitual. I thank Ben Gardner for drawing my attention to this.

4.4. Habit as dispositions, propensities or tendencies

Arguably, the most common [pl]definition of habit found amongst socio-economists, especially those influenced by Institutional Economics, is habit *as* a disposition. Sometimes other terms are used such as abilities, affordances, capacities, forces, liabilities, potentialities, potencies, processes, proclivities, powers, propensities and tendencies.[26] One of the most commonly cited definitions comes from Camic (1986, p. 1044) for whom: 'the term "habit" generally denominates a more or less self-acting disposition or tendency to engage in a previously adopted or acquired form of action'. Indeed, I too have defined habit as a 'disposition, capacity or power that generates a tendency' (Fleetwood 2012, p. 248). I now think this is incorrect.

Habit psychologists also, often define habit as propensities, dispositions or tendencies. For Neal *et al.* (2012, p. 492) 'habit can be defined as psychological dispositions to repeat past behaviour' and for Neal *et al.* (2006, p. 198) 'habits are automated response dispositions'. For Wood and Neal (2007, p. 845) 'habits are learned dispositions to repeat past responses'. For Galla and Duckworth (2015, p. 509) 'habits are automatic response tendencies that are triggered by contextual cues'. For Darnton *et al.* (2011, p. 3) habit emphasises 'a more or less self-actuating disposition'. For Verplanken (2018, p. 4) 'habits can thus be defined as *memory-based propensities to respond automatically to specific cues, which are acquired by the repetition of cue-specific behaviours in stable contexts*'.

Despite the [pl]definition of habit *as* a tendency being very common, I think this is a mistake, albeit a subtle one. For reasons that will become clear, to understand the term 'tendency' we need to start with notions of (ir)regularity.

4.5. Repetition, regularity and types of (ir)regularity

Habit is often associated with terms like 'frequently' and 'consistently', although I will stick with 'repetition' and 'regularity'. The concept of 'regularity' is central to most versions of positivism and empiricism, where it indicates the existence of a causal association. Where regular conjunctions of events, actions or states of affairs are observed, a causal association is said to exist (Psillos 2002).

Acquisition of habit requires a *degree* of regularity between the experience of the cue and the action. Indeed, it is the regularity that causes the neural changes that create the cognitive representation of the cue-action association to form in procedural memory. But, just how regular must a regularity be in order for habit to form? We need terminology that allows us to express degrees of regularity. Fleetwood's (2017) identification of four types of (ir)regularities is useful, of which the following two are important here:

[26] For further elaboration of some of these terms see Fleetwood (2009, 2011, 2012).

4.5.1. Demi-regularity or demi-repetitive

Some parts of the world are characterised by partial, approximate, rough-and-ready regularities or patterns in the flux of events – e.g. commuters *sometimes*, perhaps often, *but not always*, cycle to work. These are referred to as 'demi-regularities' or 'demi-regs' (Lawson 1997, 2003, pp. 81–83 and 105–107) and styled 'whenever event x, then sometimes, but not always event y'.

4.5.2. Stochastic event regularities

Some event regularities appear alongside terms like 'stochastic', 'probabilistic', or 'statistical' and 'statistical laws'. These kinds of event regularities are sufficiently regular as to be amenable to the standard techniques of statistics, based in concepts of probability. They are styled 'whenever event x, then on *average* event y'; or $y = f\ (x + \epsilon)$; or more accurately 'whenever the realised value of the (independent) variable measuring event x, then the conditional mean of the (dependent) variable measuring event y'. I refer to event regularities of this kind as 'law-like event regularities, probabilistically specified'.

Whilst the acquisition of habit requires a degree of regularity in the association between cue and action response, it does not require this to be law-like event regularity, probabilistically specified. Habit could be acquired via demi-regularities. If agents display demi-regular habitual action, then the degree of demi-regularity of the association, whatever it was, *must* have been sufficient for the habit to form, even if this association does not conform to any known mathematical or statistical principle such as an asymptote (Lally *et al.* 2010, pp. 997 and 1007). The same goes for habit activation. Whilst habit activation requires a degree of regularity in the association between cue and action response, it does not require this to be law-like event regularity, probabilistically specified. Habit could be activated demi-regularly.

4.6. From (ir)regularity to tendency

In no [pl] definitions of habit as tendency, that I am aware of, is the meaning of the term 'tendency' clarified. Fleetwood (2012) identifies six meanings, of which the following two are important here:

(a) *The empiricist conception of tendency* – i.e. tendency as an empirically observed (or observable) regularity in the flux of events, actions, or states of affairs.
(b) *The critical realist conception of tendency* – i.e. tendency as the way of acting of a causal mechanism.

Consider (a). Due to the pernicious influence of positivism and empiricism in economics and psychology, the term 'tendency' is commonly (mis)used.

Sometimes it is used loosely to refer to a kind of 'not-very-regular-but-regular-enough' regularity in the flux of events – and therefore behaviour. Sometimes it is understood in terms of a 'law', and often given a stochastic inflection so that the event regularities are law-like event regularities, probabilistically specified. Sometimes tendency is understood as a law, law is understood as a *causal* law and tendency is, thereby, (mis)understood as synonymous with causality as event regularity.

Empirical researchers often refer to the empirical regularities discovered in statistical analyses as 'tendencies'. Galla and Duckworth (2015, p. 509) appear to use the term 'tendency' to cover all the above, writing: 'for habit, what we *tend* to do in the present is what we have *tended* to do in the past'. The term 'tendency' is central to Bayer and Campbell's (2012) research, and whilst they do not define it, it seems to be the empiricist conception because it is a measure of how many times an act is undertaken. In the *Oxford Dictionary* (10th ed. 2000) '*Habit* is a settled tendency or practice', incorrectly equating tendency with behaviour – i.e. the empiricist conception.

Now consider (b), the *critical realist* conception where a tendency is something that *powers*, *forces*, *drives*, *propels*, *pushes*, *presses*, *shoves*, *thrusts*, *exerts pressure*, *urges*, and so on. This is very different from treating tendency as some kind of empirical pattern. Any connection between tendency and events or behaviour is broken because a tendency can be active, yet not manifest itself at the level of empirical events. Any connection between tendency and causation as event regularity is also broken because tendency can be active, and yet not manifest itself in event *regularities*. Tendencies are causal, but the conception of causality is not event regularity.

How can a tendency be active yet not manifest itself at the level of events, indeed not manifest itself at all? Simple, it is influenced by other mechanisms with their own tendencies, some of which are *countervailing* tendencies. Suppose our cinema-goer enters the cinema (experiencing the cue) but has insufficient funds, or is on a diet, and so does not buy popcorn. This does not mean the habit has lapsed. It means that habit *acts tendentially*[27] – i.e. she tends to buy popcorn even if sometimes she does not. Moreover, if our cinema-goer often does, but sometimes does not, buy popcorn, then her habitual behaviour is *demi-regular*.

This raises the question of what might prevent the cue leading to the action? Labrecque and Wood (2015, p. 303) refer to the 'circumstances under which habits are not enacted, such as when they are overridden by competing motivational forces before they are translated into behaviour' – i.e. competing causal mechanisms and their (countervailing) tendencies. These things could be *internal* to agents' cognitive systems (i.e. will power), or *external* to them

[27] Transfactually acting things *tend* to bring about certain events, period. This must not be confused with *counterfactually* acting things that *would* bring about certain events *if* certain conditions (e.g. ceteris paribus) prevail. See Fleetwood (2009).

(e.g. lack of funds), or part of the context such as place, time, situation, physical location, other people, and so on. See the next section, especially Rhodes and Rebar's (2018, p. 92) reference to 'opposing or supporting motivational influences'.

Whilst I am unaware of any habit psychologist mentioning critical realism, many appear to hold something like a critical realist conception of tendency, as the following example illustrates.

> Upon experience of the cue, the approach tendency is triggered and results in an urge to engage in the habitual behaviour. Whether the urge translates into behavioural engagement or not depends on the strength of the learned cue–behaviour association and the strength of any opposing or supporting motivational influences . . . . [T]he urge to act is automatically triggered by the cue . . . This learned cue–behaviour association translates into an approach tendency such that when the man encounters the cue . . . he feels an urge to enact the behaviour . . . This approach tendency elicits an influence on behaviour. (Rhodes and Rebar 2018, pp. 92–93)

I have a slightly different 'take' on this. This difference might be merely semantic, but it seems wise to clarify it. For Rhodes & Rebar, 'the approach tendency . . . results in an urge', with the term 'results in' implying that the urge and the tendency are two different things. For me, a person who has acquired a cinema-popcorn habit has acquired a 'learned cue–behaviour association in procedural memory'. I refer to this in slightly different terms, namely, as a 'cognitive representation of the cue-action association in procedural memory'. Experiencing the cue causes firing in the neurons that *constitute* the cognitive representation, the representation *constitutes* the urge, and the urge and the tendency are the same thing. In other words, the cognitive representation (or the learned cue–behaviour association) is the neural substrate of the urge/tendency.

In sum, it is correct to say 'habit acts tendentially' or 'habitual behaviour tends to occur'. But, it is either a terminological mistake due to ambiguous phraseology, or a category mistake to say 'habit *is* a tendency', or to define habit *as* a tendency or, for that matter, a propensity or disposition. This is not mere word-play. Habit is simply not the kind of thing that can *be* a tendency. The term 'tendency' should, however, be retained to describe the way habit (whatever it is understood to be) acts.

> Sub-conclusion §7. It is a mistake to define habit as a tendency, despite the fact habit acts tendentially.

4.7. Habit as a process

Let us start with some [pl]definitions of habit as a process.

> This definition seems particularly promising in characterising habit as a process rather than the consequence of a process or the behaviour itself. (Labrecque and Wood 2015, p. 303)

> A definition is proposed whereby habit is a process by which a stimulus generates an impulse to act as a result of a learned stimulus-response association . . . Habit may be most coherently defined as a cognitive-motivational process. (Gardner 2015a, pp. 277 and 289)

> 'Habit' refers to a process whereby environmental cues automatically activate an un-conscious impulse to perform a behaviour that has, through repetition, become associated with those cues; 'habitual behaviour' denotes any action controlled by this process. Habit forms through repetition of a behaviour . . . in a stable context . . . . This reinforces a mental context-behaviour association, to the extent that the context becomes sufficient to activate the association, which in turn triggers an impulse to perform the habitual behaviour, potentially without intention, cognitive effort or awareness. (Gardner *et al.* 2014, p. 136)

> [We] define *habit* as the process by which a person's behaviour is influenced from a prompt to act based on well-learned associations between cues and behaviours. *Habit* is the process that determines behaviour, and habitual *behaviour* is the output of that process . . . . Habits are cognitive, motivational, and neurological processes. (Rebar *et al.* 2018, pp. 32 and 42)

In addition to these comments, it is useful to consider a schematic, and a commentary that accompanies it by habit psychologists Rhodes and Rebar (2018). In just two pages, they eloquently and succinctly describe, explain and depict the main processes involved in habit acquisition and activation. It can be considered 'state of the art' (Figure 1).

> *Habit* is the process by which behaviour is influenced by well-learned cue–behaviour associations, as is depicted in the top half of Fig. 6.1 . . . Over time, as behaviour is reliably performed in the same context, people can learn to associate certain cues . . . with the initiation of the behaviour. These associations are stored in procedural memory and influence behaviour through elicitation of behavioural approach tendencies. Upon experience of the cue, the approach

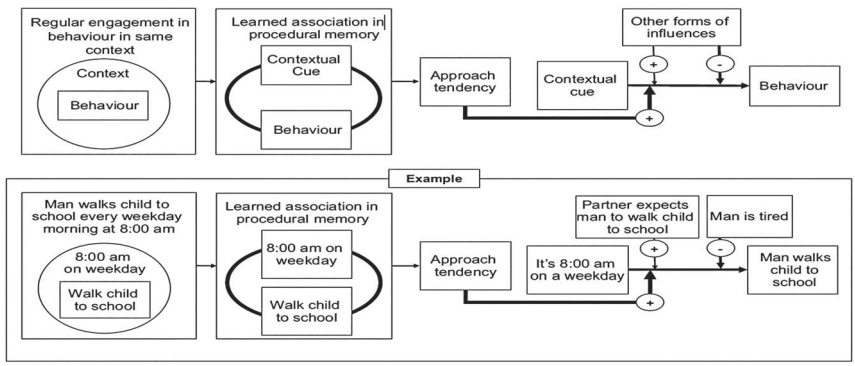

Figure 1. Rhodes and Rebar (2018, p. 93). A schematic of the process (top) and an example (bottom) of habit influencing behaviour. Reprinted by permission from Springer Nature Customer Service Centre GmbH: Springer Nature, The Psychology of Habit: Theory, Mechanisms, Change, and Contexts, edited by B. Verplanken, © 2018. https://link.springer.com/chapter/10.1007/978-3-319-97529-0_6

> tendency is triggered and results in an urge to engage in the habitual behaviour. Whether the urge translates into behavioural engagement or not depends on the strength of the learned cue–behaviour association and the strength of any opposing or supporting motivational influences (e.g. feelings of fatigue, opposing motivation or self-regulation). Because the urge to act is automatically triggered by the cue, there is less need to deliberate about why and how to engage in habitual behaviours. (Rhodes and Rebar 2018, p. 92)

Perusing their schematic and reading their commentary makes it clear that they are describing an overall process consisting of six distinct component parts, to wit:

(a) the regular engagement in behaviour in the same context – i.e. man walks child to school.
(b) learned associations between contextual cue and behaviour – i.e. at 8:00 am on a weekday morning the man regularly walks child to school.
(c) a tendency – i.e. the urge to walk child to school.
(d) a contextual cue – i.e. it is 8:00 am on a weekday.
(e) opposing or supporting motivational influences – i.e. the partner expecting the man to walk child to school, or the man being tired.
(f) habitual behaviour – i.e. the man walks child to school.

According to Gardner, it is the entire process that 'controls', causes, or is causally implicated in, habitual behaviour and, therefore, he reasons that habit should be defined *as* the entire process.[28] There are two ways of interpreting this.

The first interprets it as rooted in a philosophical perspective underlying this (although I have not seen it *explicitly* mentioned in the habit psychology literature), namely, *process philosophy*. Essentially, process philosophy, with ancient roots in Heraclitus, and more modern roots in Whitehead, has recently appeared in social science where terms like 'dialectical', 'recursive' and 'autopoietic' are used to convey the idea of on-going, dynamic processes unfolding in time. Some version of process philosophy could *implicitly* inform the idea of habit as a process. If not, we might consider the second interpretation, rooted in the perfectly legitimate idea that 'everything is in process'. Unfortunately, this can collapse into empty rhetoric. Davis (2016, p. 141) has spotted this, writing: 'it is not accurate to simply say that social reality is processual . . . as this is an incomplete characterization of the properties of social reality'.

Whichever interpretation is correct, the point is, many habit psychologists define habit *as* the entire process. And, whilst I firmly believe that habit is

[28] An anonymous reviewer wrote 'habit is not any one of these components, but rather the sum of all parts of these components, and the process by which these components operate to activate an impulse towards a specific response when the cue is encountered'.

acquired and activated via social, interpretive, cognitive, neurological, and bodily processes, I think it is a mistake to say 'habit *is* a process' and offer two reasons.

First, I noted (Section 2.1) that a taxonomic definition should not be confused or conflated with accounts that *describe*, *explain or depict*. And yet this is precisely what Rhodes and Rebar's account does. What they offer is not a definition, but a description, explanation or depiction of the processes involved in habit acquisition and activation. They refer to the habit process being 'depicted' in their schematic, without spotting that depiction and explanation are not the same as definition, writing '*explanations and definitions* of habit do not seem to be the source of this controversy' (Rhodes and Rebar 2018, p. 95, emphasis added). In fairness, Rhodes & Rebar do not actually claim to be giving a definition of habit, but it is not unreasonable to interpret them as thinking that they are doing just this. Something similar might be said of others who define habit *as* a process. Many commentators slip between *defining* habit as a process and *describing* habit as a process.

Second, to define habit *as* a process or to say 'habit *is* a process', is to make a terminological or category mistake, akin to defining water *as* a process, or saying 'water *is* a process'. Water *emerges* from a *process* of combining hydrogen and oxygen (Elder-Vass 2010). But once it has emerged, this particular process is 'done and dusted' as it were, and we are left with water as a thing, an entity. Indeed, we define water *as* H_2O, and say 'water *is* H_2O'. This conclusion cannot be avoided by invoking two popular ideas:

(i) Everything (in the universe) is *in process*, therefore, water is no more than molecular processes. This ignores *emergence*, and emergence explains why we do not point to a glass of water and say 'look at those molecular processes'. In the same vein, we do not point to a habit and say 'look at those social, interpretive, cognitive, neurological, and bodily processes'.
(ii) Water is not, strictly speaking, a thing, because once it has emerged it is always in process. It is, of course, true that the moment water as an entity emerges, it is immediately involved in processes of decay, reproduction or transformation. But note that there is always a *thing* that undergoes these processes. Habit remains habit despite undergoing various processes which make it stronger, weaker, or whatever.

In sum, *contra* those who understand habit as the entire process, there is no reason why we cannot single out one particular component part and make it the defining feature of habit. In sum, then:

> Sub-conclusion §8. It is a mistake to define habit as a process despite the fact habit is acquired and activated via (social, interpretive, cognitive, neurological, and bodily) processes.

5. Conclusion: a taxonomic definition of habit for socio-economics

The above arguments have, hopefully, 'cleared the ground', allowing us to avoid being distracted by mistakes such as the mistake of [pl]defining habit as (§1) behaviour or action; as (§2) a regular conjunction of actions; as (§3) a stock of past actions; as (§5) a mechanism; as (§6) a form of automaticity, even though habit is acquired and activated automatically; as (§7) a tendency, propensity or disposition, even though habit acts tendentially; and as (§8) a process, even though habit is acquired and activated via several processes. It is not, however, a mistake to [pl]define habit as (§4) a cognitive representation. To turn this [pl]definition into the kind of *taxonomic* definition of habit we require, I need to add (stipulate) the concepts of 'demi-regularity' and 'tendency' thus:

> Habit is a cognitive representation of a demi-regularly experienced cue and action response, located in procedural memory, acquired automatically via 'hot' and 'cold' processes, activated automatically via the 'cold' experience of a cue and tending to elicit demi-regular habitual action.

This taxonomic definition identifies the minimum number of properties sufficient to demarcate habits from other unconsciously or automatically acquired and activated cognitive representations (see Section 2.1).

The following schematics merely re-state, in summary form, the essential features of habit acquisition, and habit activation, showing the roles played by automaticity and tendency, as well as what Rhodes & Rebar call 'other forms of influences' (Figure 2).

5.1. Future research

Unlike cognitive psychologists, habit theorists rarely discuss[29] Ideomotor Theory (IMT) and/or the related Theory of Event Coding (TEC).[30] In the future, however, they may become necessary to incorporate recent developments in these theories into habit theory. Whilst this is speculative, it would be remiss of me not to mention it.

Very briefly, IMT and TEC conceive of the representations of an action (e.g. buying popcorn), and of its anticipated effect, or outcome (e.g. eating popcorn) as governed by the same neural code and integrated into a hypothetical entity called an 'event file'. Actions and their anticipated effects become

[29] Exceptions are Wood and Rünger (2016, p. 292), Wood and Neal (2007, p. 845), and Watson *et al.* (2017).

[30] Interestingly, the fundamentals of IMT were identified by a figure well-known to Institutional economists, William James in the late nineteenth century and later by Roger Sperry. IMT has, however, developed significantly since then. On IMT and TEC see Bunlon *et al.* (2015), Dignath *et al.* (2014), Haering and Kiesel (2012), Henson *et al.* (2014), Herbort and Butz (2012), Herwig *et al.* (2007), Hommel *et al.* (2001), Hommel (2009), Janczyk *et al.* (2012), Kunde *et al.* (2007), Pfister *et al.* (2011) and Shin *et al.* (2010).

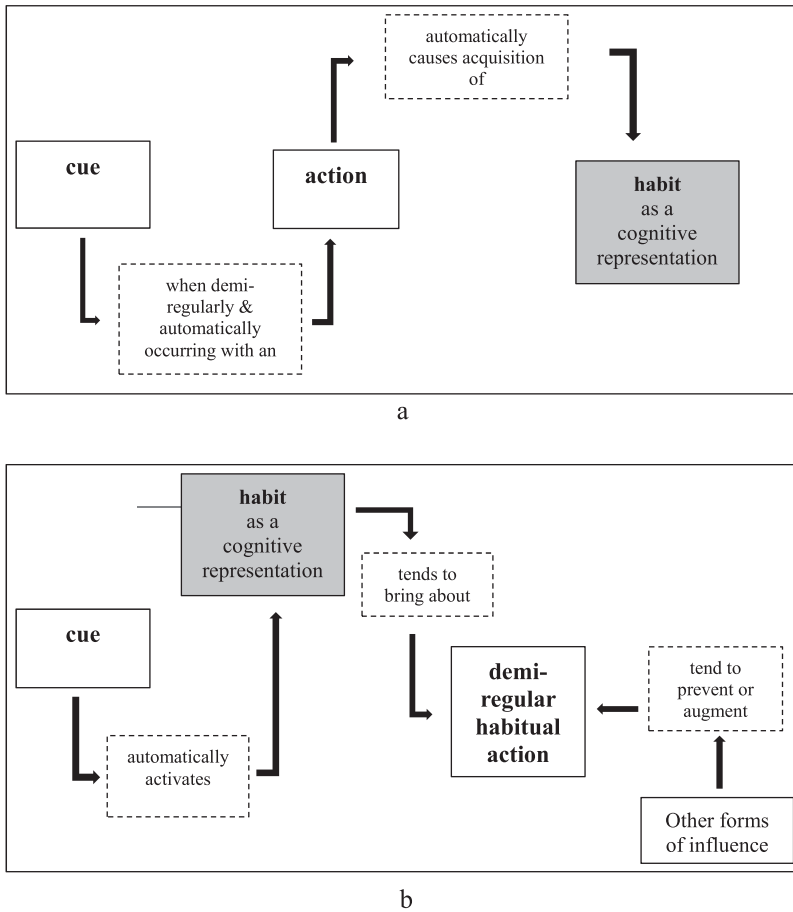

Figure 2. (a) A depiction of the processes of habit acquisition. (b) A depiction of the processes of habit activation.

bi-directionally related, meaning actions can be caused via the activation of their anticipated effects. Agents are 'pre-prepared' for, and can thus anticipate the effects of actions that have been experienced in the past and encoded as representations.

Whilst in IMT and TEC the focus is predominantly on actions and their anticipated effects, it is possible that, in the case of habit, the cue or stimulus might also be involved. The cue, action, and the anticipated effect may form a 'cue-action-effect' binding and may even be integrated in the same event file. In this case, the direction of causality between cue, action, and the anticipated effect becomes complex, giving rise to several permutations. For example, the (endogenously created) idea of eating popcorn, or the (exogenously created) image of eating popcorn, could activate the buying of popcorn, or even a trip

to the cinema.[31] One group of researchers make a similar point via the example of eating croissants.

> The smell of a freshly baked croissant can trigger the action of visiting a bakery ... However, even merely being reminded of croissants (e.g. by seeing a painting of Paris) can trigger the trip to the bakery. This indirect stimulus-outcome-response (S-O-R) priming effect ... has been demonstrated experimentally. (Watson *et al.* 2017, p. 2)

If it turns out to be the case, that the cue, the action and the effect are related in complex ways, as IMT and TEC suggest, does this undermine my definition of habit as a representation? No. Habit will still be a representation, but our understanding of this representation will require further development.

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[31] Hommel *et al.* (2001) implies it. Wolfensteller and Ruge (2011) and Baum *et al.* (2017) elaborate. See also Allenmark *et al.* (2015).

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