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# Derived insensitivity: Rule-based insensitivity to contingencies propagates through equivalence

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ABSTRACT

Rule-governed behaviours enable rapid acquisition of appropriate and often complex behaviour in novel contexts; however, this capacity can also make individuals insensitive to environmental contingencies. This problem may be exacerbated if rules propagate from one context to another through derived relational responding. Here we assessed whether insensitivity due to rule-following would transfer to stimuli that were never directly associated with that rule, by means of combinatorial entailment. Multiple reinforcement schedules (1A = VR8; 2A = DRL8) were initially presented to two groups, one receiving rules on how to behave to earn as many points as possible, the other not receiving any rule. The participants then completed a matching-to-sample task in which equivalence classes were trained in a one-to-many format (1A ⟵ 1B → 1C; 2A ⟵ 12B → 2C). Finally, the derived stimuli (1C and 2C) were presented in a second multiple-schedule task, where the associated schedules were reversed (1C = DRL8; 2C = VR8), without informing the participants. Results demonstrated that insensitivity transferred to the stimuli set in equivalence for the participants who received rules, while participants who did not receive any rule adapted quicker to the contingencies changes. Results are discussed in relation to behavioural variability and psychological inflexibility that contributes to the development and maintenance of psychological issues.

## 1. Introduction

Rule-governed behaviour (RGB) is defined as behaviour (either verbal or nonverbal) under the control of verbal antecedents (Catania, 1991), that is, instructions or rules. RGB may be contrasted with contingency-shaped behaviour, which is under the control of direct contact with environmental stimuli and consequences. For example, a child putting on a woolly hat before going outside because she previously felt the cold biting her ears would be an instance of contingency-shaped behaviour, but a child performing the same behaviour because she was previously instructed and reinforced to do so by a parent would be an instance of RGB. Verbal antecedents represent an important source of control for human behaviour, not least because they allow for the transmission of behaviours across time and space and endow people with the ability to efficiently interact with new contexts without previous direct experience (Hayes, 1989). Transmission and the ability to efficiently interact with new contexts confer an adaptive advantage for rule-following (Monestès, 2016) where it would otherwise be potentially harmful to learn from direct experience (e.g. “don’t touch the stove or you’ll get burned”).

Rules differ on numerous dimensions, one being the extent to which the contingency between behaviour and environment is

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specified (Pelaez, 2013). Some rules are generic and versatile, prescribing behaviour independently of the context, and indeed often incarnate in well- known sayings or maxims (e.g. “honesty is the best policy” or “nice guys finish last”). Other rules describe precisely the context in which a behaviour should be emitted. Yet even in the latter case, the corresponding RGB may frequently appear in different contexts. For example, one can be taught that a heavy object should not be lifted without someone else’s help and then apply the same rule in other contexts, such as lifting a large but light and fragile object, or even in a more abstract way by disclosing a chronic illness or a shameful thought to a friend, since difficult thoughts and emotions can be evaluated as “heavy”. In other words, discriminative stimuli can be part of the contingency in which the rule is stated and the behaviour is learned, but totally different stimuli can signal the possibility for this rule-governed behaviour to be reinforced. Ultimately, the behaviour can appear across very different contexts.

The capacity for transposing RGB to contexts different from those in which the rule was learned is also tied to a well-documented and potentially maladaptive property of RGB, namely, insensitivity to contingencies. When following a rule, humans tend to be more sensitive to the socially mediated consequences of following the rule itself than to the direct consequences brought by the behaviours that appear when the rule is followed. In other words, humans tend to be more sensitive to the consequences of rule-following as a response class than to the consequences of specific instances of behaviour produced by following a rule (Catania, Shimoff, & Matthews, 1989). This tendency creates insensitivity to the immediate environmental contingencies and eases the transposition of the rule to contexts distant from those in which it initially appeared. Indeed, many experiments show that rule-governed behaviours are insensitive to changes in contingencies and that having learned one rule in one context, subjects routinely follow that rule in a new context, even when the new context provides no direct reinforcement for the behaviour in question (Baron & Galizio, 1983; Catania et al., 1989; Catania, Shimoff, & Matthews, 1990; Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986; Rosenfarb, Newland, Brannon, & Howey, 1992; Shimoff & Catania, 1998; Vaughan, 1989; Wulfert, Greenway, Farkas, Hayes, & Dougher, 1994).

This insensitivity to direct and short-term consequences of rule following is tied to the essence of verbal rules: they constitute abstractions of contingencies recurrent across contexts. Consequently, rule-following overtakes contexts’ specificities and helps to rapidly transfer previously adaptive behaviour to new contexts. However, should the behaviour in question in fact be maladaptive in a new context, RGB can be particularly deleterious by resulting in the perseverance of behaviour despite adverse consequences.

Thus, the two advantageous properties of RGB, namely insensitivity to direct and short-term consequences and transposition to distant and different contexts, can give rise to problematic behaviours insensitive to immediate consequences and maintained by hypothetical long-term ones. Such problematic behaviours have been suggested as central to the development of psychological issues (Törneke, Luciano, & Salas, 2008).

While stimulus generalization can explain the transfer of RGB across contexts with common characteristics (lifting a fragile object in our earlier example), this is not the case when contexts do not share any topographical properties (disclosing a shameful thought in our earlier example). Instead, when symbolic properties are involved, Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001) proposes that arbitrarily applicable relational responding provides a more plausible explanation of RGB transfer.

Three key properties of arbitrarily applicable relational responding are pertinent here. Firstly, when a relationship is learned between a stimulus A and a stimulus B, verbally able human beings will derive a relationship between B and A (“mutual entailment”). Secondly, when a stimulus A is related to a stimulus B and then to a stimulus C, B and C are then mutually related without having ever been paired together directly (“combinatorial entailment”). Finally, when several stimuli are related, changes in the functions of one of these stimuli can result in changes in the functions of other stimuli (Ramnerö & Törneke, 2008) through transfer or transformation of function.[1]

Many studies have demonstrated transfer of function across stimuli that do not share any physical property, but are verbally set in equivalence, even when these stimuli have never been directly associated (Steele & Hayes, 1991). Additionally, transformation of function has been implicated in many psychological processes, such as avoidant behaviours (Dymond, Roche, Forsyth, Whelan, & Rhoden, 2008), causal efficacy judgments (Dack, McHugh, & Reed, 2009), conditioned suppression (Greville, Dymond, Newton, & Roche, 2014), and thought suppression (Hooper, Saunders, & McHugh, 2010). However, no study has yet investigated whether RGB-induced insensitivity to contingencies will be transposed to a new context as a result of arbitrarily applicable relational responding. Hayes et al. (1989) have previously demonstrated transfer of RGB via arbitrarily applicable relational responding but did not test for the transfer of insensitivity, as the established rule that was transferred in their experiments remained appropriate for the new context. Their design therefore precluded the researchers assessing any inappropriate persistence of behaviour.

In the present study, we examined whether insensitivity to contingencies due to RGB would generalize to new contexts as a consequence of derived relational responding. If so, then having established RGB in the presence of a first stimulus, derived insensitivity should manifest in the presence of a new stimulus that is arbitrarily related to the first via an equivalence class, even if these stimuli have never been directly associated and the rule is not stated in presence of this new stimulus. In other words, we hypothesized that insensitivity due to rule-following would transfer through stimulus equivalence to stimuli never directly associated

[1] Throughout this article, we use the word “transformation” of function when describing RFT in a broad context, and “transfer” of function when referring to relations of equivalence, such as those tested in the present study. Transfer of function represents a special case of transformation of function. Indeed, in a relation of equivalence, the function of a stimulus A transforms the function of a stimulus B in a way that both stimuli share the same functions (before set in equivalence with A, B may have other functions, or no function at all). The transformation is more evident with other relational frames (e.g. opposition). For example, if A is the opposite of B and A acquires appetitive properties, the function of B is transformed to become aversive. As it may be confusing to speak of transformation when stimuli share the same function, the term “transfer” is preferred when referring to relations of equivalence.