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Hayes (2001) discussed how language and the words we use are symbolic or ideas, a product of mental life, his description one which is reminiscent of that given by Murphy (2002). Accordingly, Hayes proposes that language emersion facilitates words to be mapped to mental units or events, these mental units or events exist previous to the acquisition of language. Once this mapping occurs, transfer from one person to another is therefore enabled via communication. Hayes (1989) suggests that extensive training with symmetrical responding creates a history with conditional discriminations and as a result equivalence class formation develops. Hayes furthermore suggests the phenomenon referred to as " Sidman equivalence" could be classed as relational associations involving language. Hayes emphasises that such process involve extensive training with symmetrical responding to form a history with conditional discriminations, and that equivalence is therefore only one of these possible relations. Within RFT many types of relational responding exist which are termed relational frames. The relational frames are defined by the three properties, the first is mutual entailment which refers to the derived bi-directionality of some stimulus relations within stimulus equivalence this could be considered the concept of symmetry in stimulus equivalence. That is to say if within a specific context a stimulus A is related to stimulus B, a relation between the reversed stimuli B and A can be entailed. The second property termed combinatorial entailment is comparable to transitivity and equivalence within stimulus equivalence. Combinatorial entailment denotes instances whereby two or more relations that have acquired the property of mutual entailment

come together or mutually combine (O'Hora, Roche, Barnes-Holmes and Smeets, 2002). If we use the example of ' more-than' it can be said that, if ' 9' is more than ' 5', and ' 5' is more than ' 1', then a more-than relation is entailed between ' 9' and ' 1', and that a less-than relation is entailed between ' 1' and ' 9'. Hayes and Barnes (1997) explain that a transformation of stimulus functions applies when functions of one event in a relational network become altered based on the functions of another event in the network resulting in derived relations between them forming. Hayes (1997) clarified that within RFT labelling of stimulus classes can be seen as " arbitrarily applicable stimulus relations". This is not to say that they are typically arbitrarily applied in the natural language context rather that within the natural language context words and objects do not share any similarity and therefore can be deemed as arbitrary responding for example, the spoken word " worm" and the physical insect " worm" share no similarity.

A fundamental process in the theory of relational responding is based upon contextual cueing. While previous research has demonstrated how human and non humans alike can respond to formal properties between stimuli, hue, brightness, length for example colour hues in pigeons (Wright et al., 1971). According it has been found that humans can additional respond to other relations that are controlled through specific contextual cues. According to Hayes et al. (1997) both mutual and combinatorial entailment are regulated by contextual cues (C rel) and the transformation of stimulus functions are regulated by additional contextual cues (C func). Within relational responding contextual cues are seen as being established at a very young age, typically during early language acquisition stages of

development. During these early stages of development children are often presented with learning situations which involves receiving an objects and then being asked to repeat the name of the object. One such example is, see object ‘ cookie’, then hear the name ‘ cookie’ followed by the child saying the object name ‘ cookie’. Additional children similarly are taught to identify such objects upon hearing a name, hear ‘ cookie’, then see ‘ cookie’. While these relations may initially be directly trained, training may subsequently lead to the emergence of untrained/derived relation responding. Contextual cues such as ‘ is’ predict that if the object is a ‘ cookie’ (object ‘ cookie’ – name ‘ cookie’) the reversal of this is also true ‘ cookie’ is the name of the object (name ‘ cookie’ – object ‘ cookie’). While training initially involved the process of differential reinforcement, name ‘ cookie’ – receives object ‘ cookie’ versus name ‘ orange’ – does not receive an object ‘ cookie’. Consequently over time the child in the absence of differential reinforcement may now identify cookie when asked ‘ Where is your cookie?’.

According to Barnes, Lawlor, Smeets and Roches (1996) derived arbitrarily applicable relations referred to within RFT as a ‘ relational frame’ can be conceived that as a type of generalised operant behaviour, as through a process of differential reinforcement patterns of relational framing are brought under the control of contextual cues (e. g., the word “ is”). It is these generalised operant behaviours that have been used by proponents of RFT to explain one of the key features of human language. There are however many other types of stimulus relations that are associated with human language which additionally may be explained in terms of generalized operant behaviour (Barnes et al., 1996). Contextual cues such as ‘ more’ or ‘ less’ for

example given sufficient exposure with differential reinforcement, which cup has more water, which bag has more sweets may also produce additional relational responses under the control of the contextual cue ‘ more’. Gross and Fox, 2009 emphasise how such relational responses can be arbitrarily applied to other events or objects, even when those events do not occasion the relational response, for example, one euro is worth more than fifty cent, even though physically the former is smaller in size than the latter. Certainly then many relations other than equivalence, such as relations of comparison and opposition previously mentioned, can additionally be derived in this manner (Dymond & Barnes, 1995; Green, Stromer, & Mackay, 1993; Roche & Barnes, 1996). According to Gross et al. (2009) the study of derived stimulus relations may provide researcher with a useful model for analyzing language and other complex human behaviour. The arbitrary nature of derived stimulus relations is analogous with the symbolism of spoken language within a natural language context. As mentioned previously, words and their physical representations often share few formal properties (e. g., the word worm looks nothing like an actual worm), yet humans nonetheless often respond to them as though they are equivalent and more so respond as if they also share many psychological functions (Gross et al., 2009; Sidman & Tailby, 1982). It is the phenomenon of deriving complex networks of relations following direct training with just a few relations which may explain the extraordinary productivity of human language (Barnes Holmes, Hayes, Dymond, & O’Hora, 2001).

Proponents of Relational Frame Theory (RFT) challenge experimental evidence from the stimulus equivalence literature suggesting that non-

human subjects have been able to demonstrate stimulus equivalence. Support in favour of the RFT position the equivalence is only formed by language able humans is supported by several published research papers. Devany, Hayes, and Nelson (1986) compared the performance of three groups of children (normal functioning levels, retarded with speech capabilities, and retarded with a language deficiency) to determine whether language capabilities influence an individual's ability to form equivalence classes. Language-able children performed better on the stimulus equivalence test than those without language, supporting a positive correlation between ability to speak and performance on equivalence tests. Indeed much empirical evidence has been conducted which finds an association between derived stimulus relations and language development. Indeed, researchers have provided evidence that the ability to derive stimulus relations link with cognitive and verbal skills (Barnes et al., 1990; Devany et al., 1986; O'Hora, Pelaez, & Barnes-Holmes, 2005; O'Hora et al., 2008). According to Lipkens, Hayes, & Hayes (1993) the ability to derive stimulus relations emerges in early childhood in particular infancy, but develops gradually approximately at roughly the same time as language skills emerge. One key argument is the non demonstration of convincing or unequivocal demonstration of such relations in language deficient humans and nonhumans (Barnes, McCullagh, & Keenan, 1990; Devany et al., 1986; Dugdale & Lowe, 2000; Hayes, 1989; Sidman & Tailby, 1982).

While no unequivocal evidence for equivalence has not yet been demonstrated by non humans there is however some studies which have examined responding using cross modals and differing response modalities

which have provided some positive evidence that equivalence may not be solely a human phenomenon. In opposition of the language argument, McIlvane & Dube (1996) stress that one limitation of RFT is the theories reliance on such studies which have failed to demonstrate equivalence class formation in language deficient humans and non humans. In sum, any future results of positive equivalence class formation in non-humans could pose problems for RFT. Sidman (1997) presents a different argument against the RFT position based on the role of a history of multiple examplar training: “ I do not understand how any number of examples can give rise to generalized arbitrary relations like reflexivity, symmetry, transitivity, and so on. Because the exemplars would possess no measurable feature in common, it is not at all evident that one might be able to generalize an arbitrary relation solely from exemplars” (p. 364-365). Sidmans’ argument is one that holds true when one considers how many of the classes that are found within natural categories (which are utilised in language) often consist of stimuli which combine arbitrary and non arbitrary features (Zentall REF: studies with children etc.)

Derived stimulus relations therefore present a challenge to behaviour analysts because more than often the results do not meet the expectations that would be anticipate under a strict conditioning paradigm; and as a result such relations are often called derived or emergent. RFT researchers counter argument to that proposed by Sidman (1997) centres on the how a combination of arbitrary contextual and social cues which control relational responding results following early language training, and that responding is not formed solely on the formal properties of the related stimuli. For humans

it is therefore a learnt ability to arbitrarily apply relational responses to stimuli based on contextual cues (Gross et al., 2009). According to Hayes, Fox, et al., (2001) emphasise how contextual cues specify both the relevant relations and the functions to be transformed in a relational frame. Hayes et al. (2001) use a metaphor of a frame to illustrate ‘‘ to emphasize the idea that this type of responding can involve any stimulus event, even novel ones, just as a picture frame can contain any picture’’ (p. 34). Within RFT research a number of relational frames have been identified and examined, including frames of coordination, opposition, distinction, comparison, hierarchy, and deictic frames of perspective-taking (Gross et al., 2009; Hayes, Barnes Holmes, & Roche, 2001).

Gross et al. (2009) emphasise that relational frames (and relational networks) describe behaviours or repertoires, not hypothetical or inferred mental structures or knowledge constructs in that the noun form of ‘‘ relational frame’’ is simply a term of convenience. Specifically, relational frames refer to contextually controlled patterns or repertoires of relational responding that individuals learn through the contingencies of reinforcement established in conjunction with their verbal and social communities (Gross et al., 2009). According to Hayes et al. (2001) arbitrarily applicable relational responding is the foundation of human language and cognition and therefore the simplest RFT definition of verbal behaviour is ‘‘ the action of framing events relationally” (p. 43). Accordingly, the definition of verbal stimuli provided by Hayes et al. (2001) is that ‘‘ stimuli that have their effects because they participate in relational frames’’ (p. 44). Relational Frame Theory however, is a behavioural theory which draws together and combines

a number of previously established behavioural principles to offer an explanation of many of the complex aspects of human language and cognition. The theoretical perspective of RFT has, nonetheless allowed researchers to provide a behavioural account spanning a wide range of complex psychological phenomena that have previously been seen as outside of the remit of behaviour analysis. The incorporation of behavioural principals has given way to the explanation of many covert behaviours such as spontaneous and apparently uncontrolled human anxiety (Friman, Hayes & Wilson, 1997), fear (ref), rule following (Barnes, Healy & Hayes DATE), self awareness (Dymond & Barnes, 1995), self-concept (Barnes, Lawlor, Smeets & Roche, 1996).

Another common criticism of RFT surrounds the lack of a detailed description regarding the history of reinforced relation responding which is a requirement before a frame of coordination can be actualised (Stremmer, 1995; Clayton & Hayes, 1999). Clayton and Hayes (1999) however stress that this lack of accountability for individual histories can all the same be described as an oversight versus a weakness in the theory and that other researchers Boelens (1994) and Horne and Lowe (1996) have already provided a detailed account of possible histories which would lead to equivalence established as an operant consistent with the view held by RFT researchers. Gross et al. (2009) exemplifies how it is the history of the acting organism which is the foundation for bringing about verbal stimulus functions. Within the RFT view both the speaker and the listener are seen to be engaging in verbal behaviour, the speaker by producing stimuli that are based on relationally framed events, and the listener by responding based

on these relationally framed events and vice versa. The RFT approach to studying verbal behaviour has led to a growing body of empirical research, applications, and conceptual analyses, including providing the theoretical basis for a popular form of psychotherapy known as acceptance and commitment therapy (Hayes et al., 1999). The wider implications of RFT has led to investigation across topics such as psychological development, rule following, logical reasoning, persuasion and rhetoric, problem solving, social behaviour, prejudice and stigma, cognitive perspective taking, sexual attraction, and even religion and spirituality (see Hayes, Barnes Holmes, & Roche, 2001).