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The relevance of cybernetics for a positive psychology approach to dyslexia

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Abstract

Purpose – The purpose of this paper is to consider the relevance of the literature of cybernetics for a positive psychology approach to dyslexia.

Design/methodology/approach – A selective bibliography is presented, which reflects the exchange of ideas between the authors, two of whom work in the field of psychology, one in educational cybernetics and the other in information systems.

Findings – Examination of the literature suggests that there is scope for the application of positive psychology to dyslexia. In the cybernetic literature there is little direct discussion of either positive psychology or dyslexia. However, these areas are linked by the themes of self-steering systems and of levels of learning. Cybernetics identifies systemic constraints and therapeutic approaches which can inform the use of positive psychology techniques with dyslexics.

Originality/value – The paper documents the relevance of cybernetic analysis to the self-regulation carried out by dyslexics, and in so doing also enriches discourse on dyslexia in the field of psychology. The paper will be of value to those carrying out research into dyslexia, and to those who are supporting or working alongside people with dyslexia.

Keywords Self-regulation, Positive psychology, Dyslexia, Second-order cybernetics

Paper type Literature review

Introduction

Dyslexia has been identified as a serious concern by parents and education systems throughout the world (Rief and Stern, 2010; Smythe *et al.*, 2004; Dyslexia Foundation of New Zealand, 2015; Understood, 2014). In the UK, the British Dyslexia Association, which presents itself as "the voice of dyslexic people", states that "Dyslexia is a hidden disability thought to affect around 10% of the population, 4% severely". As reported in Grove (2014), the Higher Education Statistics Agency documents a rise in reported dyslexia among students of 74,490-104,580 from 2007-2008 to 2012-2013. More dramatically, this represents a 22-fold increase since 1994-1995. Dyslexia is seen by many to be simply a disadvantage to the individual concerned, but this has been challenged in recent years (Elliot and Grigorenko, 2014; Logan, 2009). It has been proposed that the cognitive characteristics associated with dyslexia, and the experience of overcoming adversity, bring with them strengths in other areas. For example, Logan (2009) argues that these strengths compensate for, or even outweigh, the difficulties that are experienced in reading. In this paper we introduce this discourse, but our

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purpose is not to justify or critique a particular position. Rather, we are interested in the implications of this view of dyslexia. From this perspective, the appropriate therapeutic intervention is not to attempt to change the underlying cognitive structure and capabilities of a person with dyslexia, but rather to raise their understanding of their compensating strengths, and the ways in which these can be utilized. The work of one of the present authors, Kannangara, has been focused on applying positive psychology interventions, which are of value to dyslexics. This goal raises issues of self-regulation, and levels of learning, which are strongly related to cybernetics. The paper has primarily grown out of discussions between Kannangara and her co-author Griffiths, who works in the area of educational cybernetics. We review the literature related to this therapeutic goal, and discuss this in terms of related cybernetic concepts, as the first step towards the design of interventions which have a deeper systemic grounding, and which offer more effective support for people with dyslexia. Thus this paper presents an introductory discourse on the value of a cybernetic approach to dyslexia against the backdrop of positive psychology interventions.

The definition of dyslexia

The definition of dyslexia is contested (Elliot and Grigorenko, 2014), but the one provided by the *Diagnostic and Statistical Manual (DMS) V* (American Psychiatric Association, 2013a) is widely used in diagnosis, and will serve for our purposes. *DMS V* introduced a broad category of learning disorders, i.e., difficulties in learning and using academic skills, which are achieved to a level below those expected for the individual's age, and which are not better accounted for by intellectual or other disabilities. Dyslexia is defined as a Specific Learning Disorder (SLD), and is identified when a learning disorder is manifested through "low word reading accuracy, reading rate or fluency and reading comprehension", as opposed to, for example, dyscalculia, which is related to low achievement in numeracy (American Psychiatric Association, 2013b, pp. 66-67). It will be noted that these definitions are framed in terms of incapacity, and do not mention any compensatory strength.

The experience of dyslexia

Brian Grazer describes the negative experience of living with dyslexia in a video interview:

> I grew up living this very interesting kind of counterpoint, where I was getting all Fs, maybe an occasional D, but I had a grandmother on the other hand telling me that I was special (Koplewicz and Grazer, 2012).

He was unaware that he had dyslexia and found being in school "horrible":

> My body chemistry would always change. I would be anxious, really anxious. It would take forever to do a simple homework assignment. I would spend hours daydreaming because I couldn't really read the words (Koplewicz and Grazer, 2012).

Grazer concludes that it was the special skills that he developed to compensate for the challenges created by his dyslexia which enabled him to achieve success in life. Gladwell (2013) builds on Grazer's statements to examine the way in which the latter got through school and eventually became a well-known film producer of award winning movies, such as *A Beautiful Mind*. Gladwell also reports on the achievements of lawyer David Boies and how he developed compensatory skills to cover up his dyslexic difficulties. As exemplified by Grazer, despite their difficulties many dyslexics

develop coping strategies to manage and overcome the challenges of their condition. Bell (2009) reports on interviews with six people with dyslexia who report similar strategies in dealing with their condition.

From Gladwell's perspective, dyslexics tend to be outsiders because of the multiple challenges that they face, standing out at school because they are not able to do what is expected of them. However, many dyslexics develop coping strategies which lead them to becoming individuals with exceptional skills or talents. This finding led to research into the relationship between dyslexia and innovation and entrepreneurship. For example Franks and Frederick (2013) identify common grounds between dyslexics and entrepreneurs. They relate personal characteristics which are typical of entrepreneurs (such as achievement, creativity, determination, family development, educational development and technical knowledge) to traits which are common in individuals with dyslexia (such as persistence, conceptual thinking, intuitiveness, visual spatial skills and resilience) as well as strengths (such as delegation of authority and problem solving). Case studies (Logan, 2009) are available about entrepreneurs (Branson, 2012; Koplewicz and Grazer, 2012) and celebrities (Gladwell, 2013), as well as well-known scientists, etc. Associations for dyslexia disseminate this information, believing that it is valuable to focus on the positive aspects of the condition, rather than only the challenges, for example Dyslexia Scotland (2015).

Pino and Mortari (2014), writing in the *Journal of the British Dyslexia Association*, offer a systematic review of 15 studies, which are largely interview-based qualitative accounts on the inclusion and support of students with dyslexia in higher education. This provides a picture of the prevailing view of dyslexia, and of practice in the sector. Elliot and Grigorenko (2014), focusing on schools, provide a powerfully argued dissenting view on dyslexia in their book "*The Dyslexia Debate*", arguing that an analysis in terms of reading disability is both more parsimonious, and also socially more desirable. They point out that dyslexia is defined (e.g. in *DSM V*) in terms of a level of reading which is unexpectedly low given the intelligence or age of the reader. This implies that those readers who are assessed as being of lower intelligence have difficulty in obtaining a diagnosis of dyslexia. They conclude that:

> Rather than sustaining the current poorly defined and operationalized construct of dyslexia in the belief that children so labelled will develop more positive views of themselves as learners […], the perceived link between reading disability and intelligence or laziness should be wholly severed. Unfortunately current diagnostic procedures only serve to fuel such divisions between poor readers. The unintended consequence of this is that struggling readers, not adjudged to be dyslexic, are likely to be perceived in a more negative light and may have greater difficulty in accessing specialist service and resources (Elliot and Grigorenko, 2014, p. 181).

From the perspective taken in this paper, however, it is not of critical importance whether one adopts the terminology of dyslexia or of reading disability. The key points remain. First, those struggling with poor reading will be helped by understanding that this need not exclude them from success in life. Second, the strategies and skills which are developed to cope with poor reading may lead individuals to achieve high levels of capability in areas which do not involve literacy, and that identification of these abilities can increase the self-efficacy of the individual, as defined by Bandura (1977).

Dyslexia and the literature of personal strengths and positive psychology

Several research studies have identified cognitive strengths in individuals with dyslexia, and this work may be situated within the wider field of positive psychology.

Creativity is examined by Everatt *et al.* (2007), while pictorial and auditory memory, and original thinking are examined by Karolyi *et al.* (2003). Tafti *et al.* (2009) address both these areas, as well as visual spatial memory. Mathematical reasoning has also been identified as a positive characteristic associated with dyslexia (Miles, 2007). These strengths are shown to be commonly prominent among individuals with dyslexia (Everatt *et al.* 2007) and to be a frequent explanation for their success in their lives, despite the difficulties which they experience. These positive aspects of the condition make it coherent to suggest that the principles of positive psychology could be valuable in supporting dyslexics. Evidence in favour of this position is provided by Hornerya *et al.* (2014), who examined the academic performance and career outcomes of those with reading difficulties, showing that self-concept can make a major contribution to success. Similarly, the Reading for Life (R4L) project showed that introduction of dual approach (reading achievement and reading self-concept) can help children to reach their potential, and discover a wider range of lifetime outcomes (Hornerya *et al.*, 2014).

Positive psychology applies scientific method to the individualized and unique challenges that human behaviour displays in all its complexity (Snyder and Lopez, 2002). The goal of treatment in positive psychology is not only to correct dysfunctionalities, but also to build on and develop the strategies and behaviours that work best for individuals. The founding person in this field is Seligman (see Seligman, 2000), who now runs the Penn Positive Psychology Center. The approach of the centre can be identified with three central concerns (Penn Positive Psychology Center, 2007), as summarized below:

(1) positive emotions relates to past successes, happiness in the present and hope for the future;

(2) positive individual traits focuses on identifying strengths and virtues, which include the capacity to love and work, courage, compassion, resilience, creativity, curiosity, integrity, self-knowledge, moderation, self-control and wisdom, etc.; and

(3) positive institutions are concerned with how we can create and develop better communities characterized by justice, responsibility, civility, parenting, nurturance, work ethic, leadership, teamwork, purpose and tolerance.

A discussion of how the concerns of positive psychology can be applied in the classroom through the Penn Resiliency Program and the Strath Haven Positive Psychology Curriculum is provided by Seligman *et al.* (2009). At present many of the support systems and mechanisms available to help dyslexics do not develop the strengths which individuals already have, but instead largely address the areas that are challenging for them. An example of this is the provision of support workers at undergraduate level who can take lecture notes for dyslexic students (Disability Rights UK, 2013). Although such support may benefit students in dealing with the curriculum, it will not help them identify capabilities that can compensate for the challenges of dyslexia. The techniques of positive psychology offer an opportunity to avoid the exclusive focus on the difficulties faced by individuals with dyslexia.

The values in action test as a therapeutic support for dyslexics

The Values in Action (VIA) test identifies 24 universal strengths, which are seen across cultures, and this instrument has been one of the main pillars of positive psychology. A free online test (see www.viacharacter.org) identifies five signature strengths.

The current VIA test demonstrates a high level of reliability and validity (Peterson and Seligman, 2004). Both short- and long-term benefits are claimed for the VIA test. Resnick and Rosenheck (2006) showed how the test could be used to help recovery from long-term mental health problems. The authors describe how US army veterans report that the VIA test helped them in developing a sense of accomplishment, and that their mood improved after completing the survey and receiving the feedback. One veteran identified a signature strength of "love of learning" and this motivated him to attend the university. Moreover when feeling uncertain about himself, he reminded himself that the test had shown him that he had "the strengths to fulfil his dreams". On the basis of such reports, Kannangara, one of the present authors, has proposed that the VIA Strengths Test could be valuable in supporting individuals with dyslexia to help them develop a more positive sense of self, and to focus more on their strengths than their weaknesses.

The survey consists of a 240 item online assessment (Peterson and Park, 2009), but many individuals with dyslexia are slow at reading and writing, and it may be expected that it would be stressful for them to read 240 items in a survey at a single sitting (Callens *et al.*, 2012; Haslum and Kiziewicz, 2007). An effort is required to make the VIA strengths text "dyslexia friendly", including changing the web site interface of the survey with customizations of font, font size, background colours, text to speech, which enables the survey items to be read out by the computer, pictorially incorporated feedback of signature strengths, etc. Kannangara, Carson and Munasinghe have modified the VIA Strengths Test to address these concerns, and the revised questionnaire can be accessed at www.desirabledyslexia.com.

Cybernetics and positive psychology support for dyslexics

The relevance of cybernetics

There is little direct discussion of dyslexia in the cybernetic literature, but nevertheless there are many ways in which cybernetics can provide productive perspectives on the condition. In our discussion to this point we have reviewed selected literature which provides evidence in favour of the use of positive psychology techniques to support dyslexics. We are also interested in the wider processes involved in the proposed effects of positive psychology, and the constraints acting upon those processes. For positive psychology interventions to achieve their desired effects, dyslexics need to reflect on their own capabilities and functioning, and to engage in self-regulation activities which enhance their efficacy in dealing with the world. The theme of the system, which steers itself by means of reflection on its own nature and activities is closely related to the core concerns of cybernetics, and in particular second-order cybernetics. Indeed, MacKenzie *et al.* argues persuasively that cybernetics "has been a guiding force for models of self-regulation in psychology" but that "current self-regulation research no longer consistently refers back to the theories of its origin" (MacKenzie *et al.*, 2012, p. 155).

The strong links between second order cybernetics and psychotherapy are explored in a monograph by Barnes (1994). As Christian Beels (2009) testifies, the family therapy movement was a particular focus for these connections: "Family therapists of my generation remember the seismic shift under our feet that came with Bateson's re-location of mind in a system of interactions between communicating organisms rather than inside the brain" (Beels, p. 376). More generally, second order cybernetics informed the examination of the role of the therapist in the process of psychotherapy, in much the same way as Mead's "Cybernetics of Cybernetics" (Mead, 1968) had stimulated similar reflection in the cybernetics community. A book by Andersen (1991),

"*The Reflecting Team: Dialogues and Dialogues about the Dialogues*", is an example of this exploration, as is Hoffman's analysis of second order systems in family therapy (Hoffman, 1985, 1992), and the practice of Anderson (Anderson and Goolishian, 1992).

The present paper contributes to remaking the link to cybernetics described by MacKenzie. The paper identifies literature which is in many cases from an earlier generation of researchers, but which contains ideas which are applicable to the use of positive psychology to support people with dyslexia.

Second order cybernetics became recognized as an aspect of cybernetics in the 1970s, and (amongst others) von Foerster stated that "the cybernetics of observed systems we may consider to be first-order cybernetics; while second-order cybernetics is the cybernetics of observing systems". However, the insight that a move from observed systems to observing systems involves not an extension of a method, but rather a different logical level of problem, goes back at least to Bateson's work of the early 1950s. A significant contribution in the field was the concept of autopoiesis, whose key characteristic is:

> […] a network of processes of production transformation and destruction of components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them […] (Maturana and Varela, 1980, p. 135).

In *The Embodied Mind: Cognitive Science and Human Experience* Varela *et al.* (1991) built on the concept of autopoiesis under the influence of Buddhist thinking. This work instigated the exploration of mindfulness as a therapeutic and educational method which seeks to raise individuals' awareness of their own processes:

> Individuals vary in their abilities as observers and reporters of their own experiences, and these abilities can be enhanced through various phenomenological methods. First-person methods […] involve the systematic training of attention, mindfulness and self-regulation of emotion (Thompson, 2007, p. 339).

These ideas are related more directly to our present concerns in Balcetis and Cole (2009) *Body in Mind: The Role of Embodied Cognition in Self-Regulation.* Given their similar goals, it would be valuable to explore the combination of these phenomenological methods with positive psychology support for dyslexics.

The cybernetic critique of mainstream psychology

Despite the relevance of self-steering and reflection to dyslexia, it is worth noting that in general the positions adopted within the cybernetic tradition are unconventional in the context of mainstream psychology, within which therapeutic interventions are usually studied as discrete treatments, with the aim of isolating their causal efficacy in clinical trials. From the perspective of cybernetics this isolation of causality is problematic, as it precludes the recursive analysis which is at the heart of both first and second order cybernetics. The position of Glasersfeld is representative of the broad thrust of the wider literature when he argues that:

> The traditional view, both in psychology and epistemology, disregards the inevitable dichotomy between what can be said about observed organisms and what organisms might be able to say about their own experience (Glasersfeld, 1979, p. 68).

More specifically, reflection on the strengths associated with dyslexia is very much oriented to the goal of personal change, and cybernetics has been more comfortable

with what might be considered a teleological flavour to analysis and explanation than is mainstream psychology. As Glasersfeld again comments:

> It was unfortunate that the ascendancy of a particularly narrow minded school of psychology confounded the notion of goal oriented behavior with the independent metaphysical notion of teleology (Glasersfeld, 1990, p. 128).

Discrepancy and its consequences

During formal education, dyslexics are continually placed in a position where they cannot perform the tasks which are expected of them, and so therapeutic reflection needs to be applied to the repeated outcomes of the cycles of learning. MacKenzie describes how from a cybernetic standpoint self-regulation theory is composed of four elements in a linear feedback loop: reference, input, comparator and output (MacKenzie *et al.*, 2012, p. 156). The reference is "the value towards which self-regulation is directed. It can be a plan, a standard of comparison, a goal, or an ideal", all of which are omnipresent in schooling. When the dyslexic is required to carry out tasks which are impossible, there are repeated discrepancies between the reference and the output. The formal education system consequently classifies dyslexics as failures, and for dyslexics to be able to move beyond this classification they need to be able to take control of their own identity and the associated ascription of capabilities. This is precisely the goal of identity control theory, which draws strongly on the work of Powers. Stets and Burke define the core proposal of identity control theory as:

> Essentially, individuals bring self-in-situation meanings into alignment with their self-defining meanings held in the identity standard when there is a discrepancy, and they maintain that alignment when there is no discrepancy (Stets and Burke, 2005, p. 43).

Stets and Burke provide a table which analyses the various sources of discrepancy, and their consequences. Of particular relevance to the dyslexic in formal education is their observation that "When the source of meanings is the other and the source of the discrepancy is the self, the self will experience emotions ranging from embarrassment to shame" (Stets and Burke, 2005, p. 52). The formal modelling of this process and its consequences provided by Stets and Burke offers an approach to conceptualizing a positive psychology therapeutic intervention, as an adjustment of standards and meanings in order to reduce discrepancy.

Writing from a Perceptual Control Theory perspective, Cziko points to the way in which a response to adversity can generate alternative strategies for achieving success. By making this clearer for individuals, it is hoped to provide them with a means to construct an alternative narrative for their lives. The narrative may include an explanation for how their particular range of strengths is mismatched to the formal education system, and how this has led them to experiment with survival strategies which becomes reinforced as personal characteristics, which they may wish to celebrate or address. A consecutive pair of Ashby's aphorisms are particularly applicable to dyslexics, and provide a pithy summary of their situation:

> 103. Everyone is World Champion at some game (though it may not yet have been invented).
>
> 104. For every faculty there is an environment that pessimises it (Ashby, 2008).

From a Batesonian perspective, discrepancy can be dealt with through a stochastic process of learning in which "Reinforcement is seen as giving direction to the accumulation of random changes" (Bateson, 1972a, p. 255). Similarly Cziko states:

> […] it is in principle impossible to know exactly what type of reorganization will take place. A boy who is deprived of attention at home will look for it elsewhere. Whether he will attain it by excelling in academics, sports, or by committing a violent crime will be determined by the results of control system reorganization, whose outcome is by its very nature impossible to predict (Cziko, 2000, p. 261).

Such complexity suggests that no model will be capable of predicting the consequences of dyslexia for an individual. This reinforces the proposal that support for people with dyslexia is best approached by enabling them to identify the consequences of their condition for their own lives.

The systemic implications of diagnosis

It is often proposed that a diagnosis of dyslexia has benefits for the individual in understanding their experience. As the campaigning group, Dyslexia Action, claims "A diagnosis helps children to understand why they are struggling more than their peers and can boost their confidence and self-esteem" (Dyslexia Action, 2014). One may have reasonable concerns that this benefit, combined with access to disability support services, may muddy the scientific waters. However, the strength of this effect parallels the intervention strategy that Bateson identified in Alcoholics Anonymous (without proposing any parallel between the nature of dyslexia and alcoholism). Bateson argued that the organization was successful because it situated the phenomenon not as an external challenge to be struggled against, but rather as a characteristic of the individual, which can cease to be a problem by adopting appropriate strategies. The first step in this process is "a change in epistemology, a change in how to know about the personality-in-the-world" (Bateson, 1972b, p. 284). The positive psychology interventions which are discussed in this paper offer a means of providing a more affirmative and detailed picture of the individual characteristics that can be used in this way.

The cybernetic constraints on therapeutic interventions

Cybernetics inquires not only into the dynamics of communication and learning, but also into the systemic constraints on those processes. Bateson studied this matter in relation to psychiatry and psychotherapy over a period of many years, but here we discuss his founding contribution in his chapters included in Ruesch and Bateson (1951). Bateson asks "what are the limitations of self-observation as a process by which an individual may obtain new understanding or information about his own codification-evaluation system?" (Bateson, 1951b, p. 200). In the course of this inquiry, Bateson proposes that valuable distinctions can be drawn between different orders of learning:

> In even very simple learning experiments, such as those on rote learning, Hull has demonstrated that a phenomenon appears which is at a higher level of complexity than those which are ordinarily discussed by the psychological experimenters. It is found that an individual learning to recite nonsense syllables by rote not only learns to repeat the nonsense syllables of the given series but also becomes more skilled in learning nonsense syllables. […] The term "deutero-learning" has been coined to describe this higher order of learning, and this word can be regarded as a synonym for "learning to learn" […].

> Thus the discussion of the phenomena of learning moves forward from the type of question asked by psychological experimenters – "under what circumstances will the subject learn to do such and such?" – to a higher-level question concerning the circumstances which alter the "character structure" (Bateson, 1951a, pp. 215-216).

From Bateson's argument we can conclude that the kind of learning involved in understanding the consequences of dyslexia is distinct from the learning involved in the processes which are affected by the condition. Bateson discusses the implications of this distinction for the changes which are the target of therapeutic interventions:

> The organism has been "put in the wrong" by the environment, and now the question is what orders of new information the organism can achieve as a result of going through the whole experience of frustration and self-correction, and achieving that new system of codification and evaluation by which the frustration is reduced. Having been put in the wrong, the organism corrects itself, not merely modifying its action but modifying – more or less profoundly – the basic processes and mechanisms by which actions are related to environmental cues (Bateson, 1951b, p. 201).

Bateson builds on this insight to draw two conclusions which are relevant to our present concerns. First, he argues that the response to the conflict between the individual and the demands of the environment will not be a clean break with earlier expectations:

> It is unlikely that the old premises will be totally obliterated in the course of the change. Rather, they are likely to survive in modified or "repressed" form. It is possible, in fact, that the organism at some stage of the process of learning – and perhaps forever afterwards – will entertain conflicting premises with all the complications which this may entail (Bateson, 1951b, p. 202).

Thus we may expect internal processes to be to some degree contradictory, and that it will not be a simple task for the individual with dyslexia to disentangle them. Second, Bateson argues that insight is unlikely to follow on from improved adaptation to the environment:

> It is possible that the organism may achieve new insight into the environment but very doubtful that it will obtain new insight into the self. There may be a deutero-learning […] such that the organism which again put in the wrong will be, for example, less anxious because of an acquired faith in its own ability to deal with such misfortune. But this is only doubtfully an increased insight into the self […].
>
> A change in the premises of codification-evaluation need not denote any greater insight into these premises unless the individual can see this change as a contrast, comparing himself with what he formerly was. In such a comparison he is essentially operating as two persons between whom a contrast can be stated and a comparative method applied leading to greater insight. He is doing something comparable to what normally occurs in a two-person system.
>
> It appears then, that a two person system of some sort will always be necessary for insight therapy, but perhaps not for other types of learning (Bateson, 1951b, p. 203).

In applying this insight to our present concerns, we can conceptualize the use of positive psychology instruments as being a means of provoking an internal dialogue that permits insight into the strengths developed as a response to the condition of dyslexia. However, Bateson alerts us that this intervention stands in the place of a therapeutic relationship. While the use of such instruments may be valuable, from a cybernetic perspective it is unlikely that they will be entirely equivalent to an

interpersonal interaction in a therapeutic context. It is therefore to be expected that the use of positive psychology methods will not be a "quick fix" for dyslexia, and that they will most effectively be used in combination with a wider therapeutic programme.

Conclusions and future work

We have presented literature that justifies the use of a positive psychology approach to the support of individuals with dyslexia. We have also shown that there is substantial overlap between the goals of positive psychology and the themes of cybernetics. In doing this we seek to partially redress the state of affairs identified by MacKenzie above, in which "current self-regulation research no longer consistently refers back to the theories of its origin" (MacKenzie *et al.*, 2012, p. 156).

The literature which we have discussed in remaking this connection can be valuable in applying positive psychology to the support of dyslexics in three ways. First, as a general principal, relevant earlier work should be explored when conducting research. If there are close parallels between the thinking behind the use of positive psychology to support dyslexics and earlier work within cybernetics, then these should be noted and explored in a search for insight into current work. Second, a number of cyberneticians have looked deeply into systemic constraints which apply to the therapeutic context of positive psychology applied to dyslexia. In seeking to support dyslexics in thinking about themselves and their behaviour we run immediately into the problems of the observer who seeks to observe the act of their own observing. A key theme of second order cybernetics has been to explore the problems of epistemology, power and control. These can alert researchers working on the application of positive psychology to dyslexics to the deep questions which inevitably follow, and provide a way of conceptualizing the limits of what can be achieved. Third, there is within the cybernetic tradition a line of work which is strongly related to therapy, and which has a profound influence on some therapeutic traditions. This literature should be explored to establish if there are approaches or results which can be applied in the support of dyslexics through positive psychology, and we have found Bateson particularly useful.

Future work informed by this literature review will develop an intervention for people with dyslexia based on techniques and evidence from Positive Psychology research. These will include the Three-Good-Things Exercise from the Penn Resilience Program, identifying Signature Strengths using the VIA Strengths Test, building positive emotions, resilience training, etc. In line with Seligman (2011), we propose that these techniques could help individuals with dyslexia. This approach aims to maximize the existing strengths of individuals with dyslexia and to move away from a deficit-based approach. We believe it will be helpful in understanding the results and applications of this work to situate it within the cybernetic tradition, and in particular in terms of self-regulation, as we have outlined here.

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