

AN APPLICATION OF COMPUTERISED CORPUS LINGUISTICS TECHNIQUES TO ANALYZE TEXTS – A PERSONAL CONSTRUCT THEORY PERSPECTIVE

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To date the analysis of personal constructs have primarily been restricted to small data sets elicited via interviews, repertory grids or self-characterisation sketches. Within Personal Construct Theory (PCT) there has been growing interest in methods to analyse longer texts. Theoretical as well as technical developments in other fields offer opportunities to examine constructs and construing in longer texts. One such field is computerised corpus linguistics. A brief example is provided of a computerised analysis informed by George Kelly's "Ways of listening". Examples of the analysis and practical issues associated with the approach are discussed.

Keywords: Textual analysis, personal construct theory, constructivism, content analysis.

A key feature of personal construct theory (PCT) is the underlying assumption that individuals make sense of events and seek to anticipate future events through the use of individualised systems of bipolar constructs. Kelly describes constructs as being abstracted from experience through the process of an individual noting the likeness and contrast of various events. These discriminations form the basis of construct poles, the dimensions along which an individual construes events, locates him/herself and makes choices based on the construed alternatives. Constructs are not conceived of as fixed but subject to revision as their utility are tested against experience and either validated or invalidated, (Kelly, 1955).

The most frequently employed PCT research method is the repertory grid (Hardison & Neimeyer, 2012) though grid based research is not infrequently conducted without reference to the theory of PCT. This raises two important issues: what defines PCT research and the reliance to date, on the analysis of small data sets. In addition to PCT methods being employed without reference to the theory, individuals may operate from a variety of theoretical and methodological positions, incorporating PCT in different ways and to differing degrees. In relation to social constructionism Burr (Burr, 2015) referred to this as individuals having a "family resem-

blance", in that members of a family are not identical, but share some common features. In a review of techniques to assess personal constructs Hardison and Neimeyer (2012) adopt an inclusive approach to this question simply stating "personal construct methods are designed to assess how the individual makes sense of the world".

A previous review by the author (Green, 2004) examined methods to analyse the content of constructs derived from repertory grids, self-characterisation sketches and other approaches. A limitation of this review was that only one study was identified that analysed a longer text from a PCT perspective. Since that time a series of analyses have been undertaken utilising the textual grid approach which was developed to analyse autobiographical texts (Feixas & Villegas, 1991) and the narrative analysis method of Botella and colleagues (Botella & Gámiz, 2012; Vall & Botella, 2014). Additionally, the field of computer aided textual analysis has grown significantly which has afforded additional possibilities for the analysis of longer texts.

A brief overview of computerised text analysis will be presented as well as a review of PCT longer text research approaches. This literature provides a context for the computerised approach employed in this paper which seeks to employ methods derived from corpus linguistics,

to not only identify constructs but also to explore the premise suggested by Kelly, that certain words are indicative of constructs. To this end a method to enhance the identification of bipolar constructs and their application to elements is described. Although the method is derived from corpus linguistics the application is from a PCT perspective.

LITERATURE REVIEW

Computerised textual analysis

A large and diverse range of approaches have been developed to analyse written, oral and other forms of human expression. These approaches can differ on a range of dimensions including philosophical assumptions (Burr, 2015; Morgan, 2010), focus (Riessman, 2005) and analysis methods (Yu, Jannasch-Pennell, & DiGangi, 2011). Of particular interest to this review have been developments in computerised analysis and utilisation of methods from corpus linguistics to address concerns regarding methodical rigour and author bias of more qualitative analyses (Breeze, 2011) as well as enhancing corpus linguistic methods with more fine grained qualitative analyses (Baker & Levon, 2015; Lin, 2014)

Computer aided analysis is ideally suited to the analysis of corpus, a term used to describe collections of text by a single or multiple authors. These potentially large text collections are of particular interest to the fields of corpus linguistics and text mining. Gries has stated that corpus linguistics is among the fastest-growing methodological disciplines in linguistics and that the distributional hypothesis is a fundamental concept of this discipline, i.e., words that are distributed in a similar pattern will display semantic or functional similarity (Gries, 2015b). Gries quotes Firth, a contemporary of George Kelly: "In other words, difference of meaning correlates with difference of distribution" (Gries, 2015b).

Word distribution in this field has typically been examined through methods such as word occurrence frequencies, word co-occurrence probabilities, association measures and statistical approaches to model these relationships (Gries, 2015a). Key-word-in-context (KWIC) searches are described as a central tool of corpus linguistics

(Pollach, 2012). Concordances (lists of words and the context in which they were used) can be developed from KWIC analyses. While meaning is not necessarily equated with individual words within PCT, researchers have employed word collocation (Cordoba & Botella, 2014; Gara, 1982; Rosenberg & Jones, 1972) and KWIC analyses to develop cognitive maps of constructs (Hill, 1995).

Text mining shares an interest with corpus linguistics in examining patterns in text. In text mining, natural language processing is employed to determine patterns in the data through machine learning techniques (Aggarwal & Zhai, 2012; Khan, Baharudin, Lee, Khan, & 2010). Examples of text mining include probabilistic modelling of word co-occurrence to identify latent topics in national security documents (Mohr, Wagner-Pacifici, Breiger, & Bogdanov, 2013) and identification of psychological states through the analysis of function words, e.g. pronouns and articles (Pennebaker & Ireland, 2011). The latter approach has been incorporated into a PCT study (Cordoba & Botella, 2014).

Computerised approaches to coding and other aspects of text analysis face the same problems that human researchers face, i.e., dealing with multiple words having a similar meaning (synonymy) and dealing with a word which can have multiple meanings (polysemy). Further, with PCT research there is the issue of distinguishing word labels from constructs (Harter, Erbes, & Hart, 2004; Yorke, 1989) as well the fundamental issue of the researcher imposing their meaning when examining another's construing. Computerised analysis has the potential to increase rigour and replicability of analyses, particularly when computer code can be shared and data readily reanalysed by others.

PCT textual analysis

The first identified example of a PCT analysis of a longer autobiographical text was described by the authors as "an adaptation of the grid method to texts" (Feixas & Villegas, 1991) and influenced by phenomenological perspectives (Villegas, Feixas, & Lopez, 1990). This method was reliant on identifying a sufficient number of evaluative (e.g. personal characteristics attributed to self or another person) and relational (e.g.

personal constructs about a relationship) constructs applied in “repetitive patterns” to the identified elements. These elements were then rated employing the constructs and the resulting “textual grid” analysed by cluster analysis and various grid based indices calculated. Analyses

of elements and the relationships between constructs and elements, as well as qualitative analyses were also undertaken. This and subsequent analyses featuring textual grids are summarised in Table 1.

Table 1: *Studies employing textual grids*

Study	Text	Initial matrix	matrix reduction	Analysis matrix	Analysis method	Additional analyses
Feixas 1991	Letters from Jenny to Gordon Allport, psychologist	42 x 287 construct poles	yes	27 x 237 20 x 43 20 x 215	Cluster analysis	Grid summary measures; qualitative analysis; element & construct analyses
Winter 2007	Book by Ian Brady, serial killer on serial killers	85 x 424 construct poles	Construct poles coded using Landfield categories and Feixas exclusion rules	35 x 75	Correspondence analysis; Hierarchical cluster analysis & multidimensional scaling	Classification of constructs using Landfield coding scheme & author classification
Winter 2007	Inventory of 36 offences committed over 35 years	319 construct poles	As above for Brady’s book	12 x 31	Correspondence analysis	
Reed et al 2014	Autobiography of Rudolf Hoess, Auschwitz commandant	32 x 342 construct poles	Construct poles coded using Landfield (n=18) & Neimeyer (n21) coding schemes; and Feixas exclusion rules	29 x 59	Hierarchical cluster analysis of elements & non-linear principal components analysis; IDIOGRID Slater analysis & self-identity plot	Qualitative review; ABC (remaining at Auschwitz); self-characterisation (guilt).
Winter & Tschudi 2015	Compendium of texts by Anders Breivik, terrorist.	Matrix with too many blank cells. Constructs applied to few elements	Not applicable	Not applicable	Qualitative analysis only; ABC	

Since the paper by Feixas and Villegas a series of analyses have been published, which with varying degrees of success have employed textual

grids. In a study, described as the first independent application of the method, serial killer Ian Brady’s book, *The Gates of Janus: Serial*

Killing and its Analysis was analysed (Winter et al., 2007). Analysis of Brady's book generated a large textual grid (85 elements x 424 construct poles). A correspondence analysis was undertaken, however no factor accounted for more than six percent of variance. Cluster analysis and multidimensional scaling of elements were then undertaken as alternative analyses. Constructs were also categorised according to the Landfield construct coding scheme (Landfield, 1971). A second analysis of an inventory of 35 years of offences compiled by John who had been referred to psychotherapy was undertaken (Winter et al., 2007). The analysis of John's inventory by correspondence analysis produced a four factor solution. A content analysis of constructs was also undertaken.

The analysis of Rudolf Hoess's book, *Commandant of Auschwitz*, raised a number of issues associated with textual grids (Reed et al., 2014). The cluster analysis of the 29 element x 59 construct textual grid was reported to be not stable, with evident chaining. A non-linear principal component analysis was then performed but only weak construct relationships detected. The number of constructs were reduced by using two construct classification methods (Feixas, Geldschläger, & Neimeyer, 2002; Landfield, 1971) which further reduced the textual grid size. A Slater style principal components analysis was then performed incorporating the coded constructs. The authors noted that the matrices "contained many empty cells, resulting in skewed frequency distributions that limited the robustness of the findings". A self-identity plot analysis was also undertaken supplemented by content analysis employing the above two coding schemes, qualitative analysis of construct conflicts and other analyses.

Textual analysis of Anders Breivik's manifesto, *2083: A Declaration of European Independence* was less successful (Winter & Tschudi, 2014). A large number of construct poles were identified; however, relatively few constructs were able to be applied to any particular element rendering statistical analysis problematic. Instead a qualitative review and an ABC analysis focused on Breivik's decision to be a European resistance fighter. One potential issue with the text was Breivik's frequent inclusion of non-autobiographical material from other sources.

Overall, the textual grid method can provide useful insight into an individual's constructs and construing. However, some texts were reported to be difficult to statistically analyse (Winter et al., 2007; Winter & Tschudi, 2014). The initial matrices were typically sparse, requiring reduction in the number of constructs and elements. In one analysis, which employed two different coding schemes, the results were somewhat different (Reed et al., 2014). The very time consuming nature of transforming a book into a textual grid has been identified as problematic (Winter et al., 2007).

A series of studies derived from relational constructivism have examined psychotherapy and other narratives, including self-characterisations sketches. Relationship constructivism (Botella & Gámiz, 2012) is described as seeking a dialogue between constructivism and social constructionism, enriched with narrative and postmodern approaches. Accordingly, the focus of this approach is broader than PCT. Botella and Gámiz state:

"The relationship between narratives and constructs can thus be equated to the one between a text and its title. A title (i.e., a construct) is useful for the sake of brevity and condensation ... However to appreciate the complexity and nuances of the author's intention, one needs to read the whole text (i.e., the whole narrative)" (Botella & Gámiz, 2012, p. 257-258).

In addition to analyses being informed by the 10 underlying assumptions of this approach, these assumptions have been operationalised into a narrative assessment grid (NA-grid) (Vall & Botella, 2014). The grid is a structured series of questions reflective of five dimensions which are scored. The five dimensions are: Structure and coherence (e.g., *General orientation of the narrative*), Complexity of the content (e.g., *Thematic variety*), Narrative process (e.g., *Degree of objectivation*), Narrative intelligibility (e.g., *Grade of clarity of the rated ultimate goal*) and Narrative position of the self (e.g., *The protagonist appears completely impotent, subject to the circumstances; all the actions are motivated by external forces*). With the exception of the final dimension, the items are scored as low, medium or high (item 4.8 is scored yes/no) and therefore could be considered as supplied constructs.

Analysis is supplemented by an overall narrative style interpretation. The NA-grid approach provides for a detailed assessment of a text, however, considerable training or at least understanding of the approach, would be required to ensure items are understood and scored as intended. To date this approach has only been employed within the research group associated with the main author. Recently this research group has also examined speech transcripts of patients with obsessive-compulsive disorder via computerised text analysis methods (Cordoba & Botella, 2014).

METHOD

Text to be analysed

The text to be analysed, *My Twisted World* (Rodger, 2014) was the manifesto written by a young man immediately prior to embarking on a series of murders. It was selected because the topic had relevance to the author's professional employment, was available in electronic form and, importantly, offered a personal account likely to contain personal meaning. The introduction to this text includes the comment: "This is the story of how I, Elliot Rodger, came to be. This is the story of my entire life. It is a dark story of sadness, anger, and hatred. It is a story of a war against cruel injustice". The text was 137 pages and 107, 927 words long, with an Introduction, an Epilogue and organised into time periods, e.g. Age 0-5.

Method conceptual background

'Europe's matrix of decision' was originally presented at the 1962 Nebraska Symposium of Motivation (Kelly, 1962/1996). During its preparation Kelly had a heart attack but in 1960 visited 36 countries with his wife. While the substantive content of the paper was a description of European construct dimensions there is also discussion of methods to elicit constructs. Covering just over two pages is a section titled "Ways to listen". While the focus of this section is on the analysis of conversation the concepts are considered to be applicable to the analysis of text and

extends Kelly's discussion regarding the analysis of self-characterisation sketches (Kelly, 1955).

Underlying Kelly's discussion of listening are two central principles. Described as an "axiom" of psychotherapeutic interviewing Kelly stated that although a person may readily change the subject the theme rarely changes. Secondly, Kelly noted:

Indeed, almost anything that a person chooses to say in a conversation may be regarded in either of two ways; a further elaboration of something that has just been said or of something the presence of his listener implies to him, or on the other hand, it may be regarded as a statement having salience; that is to say, something that stands out in clear contrast to what has just been said by others, or distinguishes itself from what the listener is believed to represent. (Kelly, 1962/1996, p. 48)

To structure the dimensions of a conversation Kelly noted the need to be alert to the construct dimensions which "serve to conjoin and separate the elements of the conversation". In what he describes as ordinary conversation, Kelly noted that a person will vary the content of what is being said but will be repeating certain construct dimensions, approaching the construct at different times from one pole and then the other. The task of listening is described as attempting to "abstract from what is being said the true axes of the speaker's system" rather than imposing the listener's constructs upon what is being said (Kelly, 1962/1996).

Following an introduction Kelly proceeded to "a more technical level" discussion regarding the analysis of conversation. Kelly listed examples of words that are "obvious signs of contrasts and linkages", such as the "buts", "On the other hands" and "therefores". Other words that Kelly suggested the listener needed to be alert to included synonymous use of terms, modifiers of nouns and chains of modifiers, name calling and generalisations which Kelly referred to as "common features of propaganda" and likely to carry idiosyncratic personal meaning. Distance-making modifiers, such as "that class of people" or "that versus this" were also noted to be of importance. While Kelly's focus was the more in-

teractive process of conversation his technical discussion and comments regarding breaks in the chain of a person's logic, disengagement from a topic or avoidance of certain topics are also applicable to written texts.

Method development issues

A key consideration for exploring computerised methods of text analysis was the aim of efficiently and systematically enhancing the identification of both elements and constructs from longer texts. Gries (Gries, 2009) described word frequency lists, word co-occurrence and keyword-in-context (KWIC) analyses as three basic methods of corpus linguistics. All three methods were trialled to identify elements or constructs.

For the purpose of this project Kelly's definition of an element as "The things or events which are abstracted by a construct" was employed (Kelly, 1955). This definition was broad and allowed for persons, organisations, groups or social issues to be considered as elements. Initial experience with the analysis of two corpus, the newspaper columns by Australian Andrew Bolt (Summers, 2011) and Elliot Rodger's manifesto indicated word frequency searches (i.e. a search that locates words which occur a specific number of times) were effective means of identifying likely elements.

As searches also identified non-elements the task of reducing the number of likely non-elements was made easier by removal of designated stopwords (e.g. frequently occurring words such as *and* or *the*). Searches were also required to ensure that first and surnames were not treated as belonging to separate individuals.

Identifying an appropriate word frequency criterion required an iterative approach. A word frequency of 50 had been selected in the Bolt analysis because a higher criterion resulted in important elements being omitted and lower frequencies produced too large a number of potential elements. The same criterion of 50 applied to the Rodger text identified 15 elements, the majority of which were family or generic elements (e.g. father, mother, girls or boys). Reducing the search word frequency criterion to 20 doubled the number of words to peruse from 253 to 568 and resulted in an additional five specific individuals. Further reducing the criterion to 10 and

five resulted in a higher number of non-generic elements. When the construct indicator keyword-in-context (KWIC) search was conducted the elements were primarily generic elements so the higher criterion of 50 was adequate for the general analysis reported below. To explore key issues in Rodger's earlier life consideration of other elements would be indicated, employing a criterion lower than 50.

A number of strategies to elicit constructs were trialled. Words that co-occurred with elements were examined as a statistical correlation and as a frequency (e.g. examination of bigram patterns) to identify potential constructs. Word associations were not found to be useful to identify constructs for several reasons. Firstly, there were a large number of words that attained a high correlation which consequently required significant manual filtering as the majority of the word associations were with words that didn't convey particular personal meaning (e.g., *the*). Secondly, constructs were not necessarily associated with a single word or words. Word cloud graphs which depict associations at a certain criterion (e.g. 0.90), can provide a quick display of associations with a specific word, however, as noted the majority of words were uninformative, though stopword removal could be employed to remove words like *the*.

An initial approach to identifying constructs was to undertake KWIC searches based on searching for individual elements and their context. KWIC searches can be customised to specify the number of words either side of the word being searched for. Element searches provided an understanding of how individual elements were construed. An alternative and more theoretically interesting approach was to apply Kelly's concepts regarding listening to conversations to these searches. KWIC searches can employ what will be referred to as construct indicator words, synonyms of words likely to indicate likeness (e.g. *same*, *similar*, *like*) or contrast (e.g. *instead*, *rather*, *but*). Words that serve to join as well as words that serve to separate are relevant construct indicators. A test of searches using these words on a previous text had produced interesting results and the word *instead* was selected for the purpose of the analysis undertaken for this paper as it had previously identified personally salient themes and occurred with moderate frequency (as compared to high frequency

words such as *but* or words such as *opposite* or *versus* that didn't occur at all). If high frequency construct indicators are used additional strategies would be required to make the task less onerous, e.g. sorting by the word either side of the construct indicator, saving the results, performing searches in terms of elements or bigrams of interest as well as content analysis.

Method application

Step 1

The text to be analysed was read to obtain a sense of its structure, key themes, individuals, locations and nuances of the text, such as idiosyncratic use of words or the inclusion of quotes or text from other sources. While reading a very large corpus (e.g. multiple books or blog posts) might be problematic selections of the corpus could be randomly sampled or sampled based on preliminary element searches.

Step 2

A number of standard transformations were undertaken. Transformations included the removal of unwanted whitespace between words; removal of capital letters, punctuation or numbers; or word stemming which reduces words to a basic stem (e.g. *stalked*, *stalking*, *stalker*, *stalk* would all be reduced to the word *stalk*). Also, commonly used words that didn't convey personal meaning, such as *the* or *also* were removed as stopwords. Care was required as a seemingly mundane word might be used in a highly personal way or numbers might have particular importance that needed consideration. An iterative process was involved, with analyses conducted with and without transformations to determine, whether a particular change was helpful or not.

Step 3

Word frequency searches were undertaken to identify elements. As Rodger's manifesto was structured into chronological time periods, searches were also undertaken by time period to

determine which persons were important within and across time periods.

Step 4

A KWIC search were undertaken to identify constructs to produce concordance tables (Gries, 2009). A concordance table displays all instances of a specified key word, with a column to the left containing preceding context and a column to the right of the key word, displaying the context following the key word. These tables required manual review to identify likely constructs. Rows which weren't of interest were removed and results could have been manipulated in a variety of ways, including coding using a standardised schema or researcher devised coding scheme (Green, 2004); reported by theme, time period, examined in terms of specific elements or in terms of Kelly's diagnostic dimensions or dimensions of transition (Kelly, 1955). In the current instance the search focussed on the construct indicators *instead* and *same* applied to three text sections (age 13-17, age 17-19, age 19-22) from the corpus.

Step 5

The final step was review of the concordance table and interpretation of the results. In this instance this was relatively straightforward as a single analysis was undertaken. Additional KWIC analyses could have focussed on elements and construct indicator words to address hypotheses developed as a result of the initial formulation derived from the *instead* and *same* analyses, for example in terms of Kelly's diagnostic constructs and dimensions of transition (Kelly, 1955).

What distinguishes this approach from a typical concordance table is that the focus is on identifying constructs, e.g., words or phrases that represent important discriminations employed to make sense of the world. One criterion in this regard is the repeated use of certain words or phrases, while constructs have also been operationalised in terms of grammar (Villegas et al., 1990). These latter authors, in describing evaluative constructs, noted that generally constructs

“have a qualifying function, that is an adjectival function” whereas relational constructs were defined by “the verb of the clause which constitutes the relational construct”. The use of construct indicator words is intended to reduce some of the potentially arbitrary process of identifying what is a construct.

RESULTS

The results from this single KWIC analysis are presented in the following three tables.

The first two searches employing the word *instead* (text for age 13-17 and 17-19 years) identified only 4 instances each, whereas the third search (text for 19-22 years) identified 22 instances of the word *instead*. For the purpose of

brevity only a selection of results are displayed in Table 4. In response to reviewer feedback, analyses employing other contrast words were undertaken and a likeness indicator, *same*. The respective word frequency for the overall time period (13-22 years) was: *but* (n=307), *not* (n=117), *against* (n=34), *rather* (n=7), *opposite* (n=4), *contrast* (n=3), *difference* (n=1) and *versus* (n=0). KWIC analysis of *against* indicated that it predominately identified areas of conflict.

At ages 13-17 the constructs related to parents, though there was an indication of Rodger’s feelings of isolation, inferiority and envy. In the next time period from 17-19 years difficulties with role and social adjustment were evident, as well as disappointment at not receiving a birthday phone call.

Table 2: KWIC search results for “instead” from text relating to 13-17 years

Preceding context	Key word	Subsequent context
crying in the car on the way there , and my mother gave in .	Instead	of taking me to school , we went to the café at Gelson ’ s
He kept insisting that he take me on the motorcycle whenever we went out ,	instead	of going in the car . This would be too embarrassing for me , and
definitely alert father and Soumaya . I got too nervous and abandoned that idea .	Instead	, I waited until everyone woke up and had breakfast . My plan was ruined
was to fit in with those popular kids who lived such pleasurable lives , but	instead	I was ridiculed and reviled by them . They made me feel so inferior and

Table 3: KWIC search results for “instead” from text relating to 17-19 years

Preceding context	Key word	Subsequent context
of them . I spent the next couple of weeks focusing on writing for myself	instead	of working on my schoolwork . The class didn ’ t give much homework to
. My father didn ’ t even deign to give me a phone call .	Instead	, he sent me a letter wishing me happy birthday and telling me that he
Such an opportunity wasted , all because no girl would give me a chance .	Instead	, I was all alone , and I had to see another couple watch movies
the mornings , pretending to my mother that I was going to college , but	instead	I went to Barnes & Noble and sat there until my mother left for

The constructs between ages 19-22 reveal a repeated sense of invalidation (10 constructs related to others being chosen by women instead of him, another four concerned how instead of victory or sex he experienced some form of defeat and two related to hiding his feelings). Examples of these more frequently occurring constructs are included in Table 4 and clearly reveal his struggle to grasp not only why women

weren't attracted to him but to inferior others, that his life was not successful as well as his growing aggression directed outward, with references to punishment and retribution. The additional six constructs identified by the use of *instead* related to how he construed his parents and flatmates (n=3), location options for potential victims, being ignored in a counselling session and a construct pertaining to treatment of his leg.

Table 4: KWIC search results for "instead" from text relating to 19-22 years

Preceding context	Key word	Subsequent context
together , to feel her love ! That is what I want in life .	Instead	, I had to watch other men experience my idea of heaven while I rot
should be the one with the hot blonde girl , making my father proud .	instead	, my father had to watch me suffer in a pathetic position . Life is
the females away from me , and the females deserve it for choosing those males	Instead	of me . Ever since I was seventeen , I often fantasized about becoming powerful
happy life . I couldn ' t believe how wrong everything was turning out	Instead	of finally getting a chance to live a life of sex and love like other
I felt almost made me explode with rage right there at the party , but	Instead	I went to the bathroom and vented to myself in the mirror of how much
I was certain of my victory , right at the moment of the drawing .	instead	, it turned to a crushing defeat , just like everything else in my life
? Why do they have a perverted sexual attraction for the most brutish of men	instead	of gentlemen of intelligence ? I concluded that women are flawed . There is something
, before dropping it out of the familiar frustration of girls talking to other boys	Instead	of me . This last ditch effort of desperation to once again try to live
was the girls . I wanted to punish them for talking to the obnoxious boys	instead	of me . It was one of the most foolish and rash things I ever
back to my room in triumph with a beautiful girl on my arm , but	instead	I stumbled back to my room with a shattered leg and shattered hopes. My
and the females deserve to be punished for giving that pleasurable life to those males	instead	of me . On the Day of Retribution , I will finally be able to

Due to space restrictions the KWIC results for *same* have not been reported. The number of occurrences of *same* for each respective time period was 5, 19 and 50. To assist interpretation with the large number of overall instances of *same* (n=93), the right hand pole was sorted. This revealed instances of little interest (e.g. *same shirt*) but also insight into how Rodger construed himself: “Facing the world was tough, and it took its toll on me, especially since I’ve seen no results. I was still in the *same* position I had always been: Lonely, unwanted, and miserable” and as his options constricted: “and now I was still in the *same* position, except that the dark path was soon going to reach its climactic end”. The elaborated pole for Rodger was loneliness, rejection and injustice, which made the alternative of retribution justified and the only option available after repeated rejection.

These analyses were undertaken with TM (Feinerer & Hornik, 2015), a text mining package which integrates with the statistical program R (R Core Team, 2015). However, other applicable software could be employed.

DISCUSSION

Two simple KWIC searches employing construct indicator words were used to illustrate how quickly insight might be gained into an individual’s construing, including an individual’s perceived pathways for action. While further searches based on elements (e.g. men, boys, females or girls) or constructs (e.g. rejection or retribution) identified in the above search could have been undertaken for a more in-depth analysis the method was considered to be efficient and sensitive to the nuances of Rodger’s construing.

Consistent with Kelly’s focus on identifying themes, the approach doesn’t seek to comprehensively identify all constructs as might initially occur in a textual grid, but rather to particularly focus on repeated constructs, which are assumed to be especially meaningful. This selection process does raise potential concerns regarding researcher bias. However, this issue is not unique to this approach. While computerised analysis allows for greater transparency and replicability than a purely narrative analysis there is still considerable room for researchers to select

different construct indicator words and then take different directions in terms of selecting which particular elements or other constructs to focus on. These issues can be dealt with in a number of ways, such as pre-specifying words to be searched or criteria to be employed, clearly articulating the analysis decisions made and why, describing analyses which yield no significant findings or by involving more than one researcher.

In terms of texts suitable for analysis, an essential requirement is that a text is sufficiently long and comprised of complete sentences to enable KWIC analysis and is in an electronic format to enable computerised analysis. It remains to be tested how the approach will work in languages other than English or whether there are certain text types which prove difficult to analyse. Texts with relatively few adjectives or that are just a recitation of facts, would likely pose difficulties, while a text with a lot of quotes from different sources would require considerable editing. While the software used in this project was open source and expensive software wasn’t required a certain level of computer skills or access to such skills was required.

This method is open to further elaboration and extension, as well as change and being incorporated into other approaches. For example, words could be tagged by part of speech which could be used to identify adjectives and other parts of speech that serve as the noun modifiers (e.g. adjectives) which Kelly recommended attention be paid to.

There has been interest in the PCT literature regarding social constructs and politics. These are fields where this method could possibly be employed. This approach seeks to build on the large and sophisticated corpus linguistics and text mining literatures, while building on Kelly’s technical discussion regarding identifying constructs. The method employed here could also be incorporated into other PCT analyses but also highlights how other fields can potentially vitalise and PCT clinical and research practice, which in turn offers a theory developed to examine meaning making.

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