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Correlational analysis of challenging behaviours

by

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Abstract

It is argued that challenging behaviours can be better understood if a correlational analysis (looking for correlations between the occurrence of the behaviour and other variables) is used in addition to functional analysis. A case example is provided of a man whose aggressive outbursts were negatively correlated with trips out of his unit.

Introduction

Emerson (1995) notes that people with learning disabilities who show challenging behaviours are more likely to be abused, to be treated with powerful psychotropic medication, to be denied access to community based facilities and to be placed in unstimulating institutions. In addition their behaviour is likely to be a major source of stress to their carers, and to persist over many years. Helping these clients is therefore a major priority of both service providers and researchers.

Psychological research over the last twenty years has produced convincing evidence that challenging behaviour can be functional, that is, it results in something rewarding for the client or allows him/her to avoid something unpleasant. In particular, experimental functional analysis has been a very significant method. The procedure involves observing how a client behaves in a series of conditions in which the antecedents and the consequences of his/her behaviour are controlled (c.f. Iwata et al 1982/1994a). If the conditions associated with the high rates of challenging behaviour can be identified in these analogue conditions it is suggested that these are the antecedents and consequences that are effecting the client's behaviour in the real world. This information has then been used to develop successful treatments (c.f. Carr, Newsom and Binkoff 1980; Iwata et al 1994b). However, it has recently become apparent that the factors controlling challenging behaviour can be complex. It has been shown that some challenging behaviours may be reinforced by more than one reinforcer (Smith et al 1993), that reinforcers can change, either over time (Lerman et al 1994) or across situations (Emerson et al 1995) and not all functional analysis is able to identify what is reinforcing the challenging behaviour (Lerman et al 1997). Also, it is becoming increasingly clear that events other than the availability of the identified reinforcer, or aversive situation are important in determining whether challenging behaviour will occur. For example Kennedy and Itkonen (1993), found that what happened before school had a strong influence on the challenging behaviour shown in school by two young women. In one case, this was staying in bed too long, and in the other, it was the bus stopping too many times on the way to school. Similarly, Touchette, MacDonald and Langer (1985), report a case of a young man for whom the presence of a particular member of staff was correlated with self-injurious behaviour. Theoretically, these findings have been explained in terms of setting events, that effect behaviour by influencing future stimulus response interactions (Wahler and Fox 1981) and/or establishing operations (Michael 1982;1993) which affect behaviour by determining whether other stimuli will be reinforcing or aversive. There is now evidence that the client's mood may well be a factor in determining if he/she will show challenging behaviours (c.f. Emerson 1995). For example, Durand and Mapstone (1998) showed that playing fast beat music to 3 adults with severe learning disabilities, resulted in more positive affect and less challenging behaviours, and Lowry and Sovner (1992), present two case studies of clients with profound learning disabilities who suffered from rapid cycling bipolar mood disorder. In one case self-injury was associated with the depressive part of the cycle, in the second aggression was associated with the manic phase.

These findings show that challenging behaviours can be determined by several variables, some of which may not be present when the behaviour occurs. If this is the case, particularly if the behaviour is of low frequency, then it may not be possible to use an experimental functional analysis to identify the controlling stimuli. This problem was anticipated by Wahler and Fox (1981), who suggested that, in addition to experimental demonstrations of the influence of a particular stimulus on behaviour, a correlational analysis

could also be used. This involves looking for significant correlations between environmental events and behaviours. This type of analysis, although not a demonstration of the control of a variable over behaviour, could be used when it was not possible to do an experimental functional analysis. For example, to look at the effects on behaviour of environmental events such as a thunder storm which can not be experimentally manipulated, or past events that are associated with higher rates of challenging behaviours such as a disturbed night's sleep. One method of identifying these setting events is to ask people who know the client what they consider the setting events to be, either using a structured interview or a check list (see Miltenberger 1998 for a review). However, in addition to this method being subject to problems of reliability of the informant's memory it also would not be able to identify relationships between behaviour and environmental events that required further analysis to be apparent. One method of analysing the relationship between behaviour and environmental events is that of the scatter plot (Touchette, MacDonald and Langer 1985). This involves plotting the occurrences of the challenging behaviours on a grid which divides the day up into half hour intervals on the vertical scale, the degree of challenging behaviour during an interval being indicated by the amount of shading on the grid. When the plots for several days are then viewed together it may be possible to see patterns in the occurrences of the target behaviour across the day. This method has recently been systematically evaluated by Kahng et al (1998), who observed the challenging behaviour of 20 clients over a 30 day period and put this data on a scatter plot. However, they were not able to find any clear patterns of behaviors over the day by visual inspection of the plot. In order to detect patterns in the data that may have escaped visual inspecting they then went on to subject the data to statistical process control (SPC) (Wheeler and Chambers 1992). However, although they were able to detect periods of the day when there was a statistically significant higher rate of challenging behaviour they were not able to relate this to any environmental events. Kahng et al (1998) therefore felt that the scatter plot was a method with limited utility, although they did say that if it was supplemented with statistical procedures such as statistical process control it may be useful as an initial assessment when other methods are uninformative (e.g. when behaviour occurs at a very low rate or inconsistently across activities). However, for a scatter plot to be useful one would still need the challenging behaviour to occur several times a day.

An additional consideration when assessing low frequency challenging behaviours (those which occur less than once a day) is that of getting reliable data, as it is not practically possible to have an independent observer observing the client for several days to get the data. One possible solution to this is to make use of the information recorded in the client's case records or incident sheets. Although this data may not be reliable in the scientific sense, Whitaker and Lamb (in press), argue that uncertain reliability need not prevent data from being used to obtain clinically useful information. They justify this for the following reasons. First, records of low frequency and highly intense challenging behaviour are more likely to be accurate than those of high frequency less intense behaviours, as it will be less ambiguous to carers that the behaviour has occurred. Secondly, although data may not be accurate in absolute terms, it may be accurate in ordinal terms, which means it could be analysed using nonparametric statistics. Thirdly, if correlations were used, then errors in the data would decrease the chances of getting a statistically significant result. Although this means that a correlation between a variable that was affecting behaviour, and the behaviour would be less likely to be significant, so some important influences

on behaviour may well be missed. If a correlation was significant in spite of these errors, one could have confidence in it.

Case illustration

John was a man in his 30s who had autistic features in addition to moderate learning disability. He had lived for a number of years in a specialised unit for people with learning disabilities who show severe challenging behaviour. About once or twice a week he had an outbursts of self-injury and/or aggression. Looking at how he spent his day suggested that he had an unstimulating life, he was difficult to engage and appeared to become upset if his routine was disrupted. Staff on the unit felt that it was important for him to go out of the unit for walks, however, this was happening on an irregular basis and was not part of his routine. It was unclear if going out had any effect on his challenging behaviours, and if so how. For example, going out could have reduced his aggressive outbursts by providing him with more stimulation, or provoked the outbursts by disrupting his routine. In order to try to answer this, we looked at the relationship between his going out and his aggressive outbursts.

An analysis was done on the information in his files for the past 6 months. A significant negative correlation was found between his going out and his aggressive outbursts (Kendall's tau= -0.30 $P < .05$). It was also apparent that over this 6 month period going out had increased and aggressive outbursts had decreased. This analysis therefore showed an association between the client going out and not having temper outbursts which suggests the possible hypothesis that going out was having the effect of decreasing the temper outbursts. It therefore seemed that it could be important for him to go out on a regular basis. This was emphasised to the staff on the unit who were able to give it a priority. Following this he continued to go out on a regular basis and the rate of his temper outbursts continued at low zero rate for the next 4 weeks.

Discussion

We have argued that correlating the occurrence of challenging behaviours with the occurrence of environmental events can help produce or support hypotheses as to the determinants of a challenging behaviour, and therefore help in the design of a treatment. The case example we provide illustrates how information recorded by staff in a client's case records can be correlated to produce clinically useful information with regard to the influences on the client's challenging behaviour. In this case it would have been difficult to do a formal experimental functional analysis: first, because of the low frequency of the challenging behaviour (c.f. Whitaker 2000); and secondly, because the behaviour was of such an intense nature that it would not have been ethical to put the client or staff in a situation that could provoke it.

However, if this method is used, then one needs to bear in mind that the evidence it provides is not proof; there are several sources of error in the data and other interpretations of the results. First, as Whitaker and Lamb (in press) point out there may be considerable error in the data gleaned from the client's case records, both in terms of the occurrences of his/her challenging behaviours and in the environmental events that they are correlated with.

Secondly, a correlation between two variables simply shows that they vary systematically in the same or opposite directions and not that one causes the other to vary. It is therefore possible that a third variable could have affected both the variables that we correlated. For example, in the case of John, both the increase in going out and the reduction in his outbursts could have been due to better management of staff on the unit, ensuring that they were both able to manage his behaviour better and were organised so that he was able to be taken out. Thirdly, even if there is a causal relationship we don't know the direction of the causation. For example with John, he could have gone out more because his behaviour had improved, rather than going out causing his behaviour to improve. Fourthly, even if there was a causal relationship in the direction we hypothesised, we still do not know the mechanism by which the environmental variable affects behaviour, though ideas about setting events and establishing operations may be a useful way to theorise about what is happening. We would therefore like to suggest that correlational analysis should be used but that the results are interpreted with caution.

Conclusion

It was argued that, although experimental functional analysis can be very effective at identifying the determinants of challenging behaviours and interventions based on such analysis can radically reduce the behaviour, nonetheless the use of such analysis is limited. In particular functional analysis is far less applicable to multiply determined and/or low frequency challenging behaviours. Therefore there is a need to develop other methods of analysing such behaviours. Correlational analysis has been suggested as one method that could be used. However, a great deal of caution should be exercised when interpreting the results of such analyses clinically as there is likely to be error in the data and because correlations cannot show a causal relationship between behaviour and environmental events. Therefore, the results of such analysis should not be used to do more than generate tentative hypotheses as to the determinants of challenging behaviour. These hypotheses could then either be tested using a functional analysis, or if this was not feasible, used to design a trial intervention, which, due to the speculative nature of the analysis, would need to be carefully evaluated.

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