On the Distinction Between the Motivating Operation and Setting Event Concepts

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Abstract In recent decades, behavior analysts have generally used two different concepts to speak about motivational influences on operant contingencies: *setting event* and *motivating operation*. Although both concepts still appear in the contemporary behavior-analytic literature and were designed to address the same antecedent phenomena, the concepts are quite different. The purpose of the present article is to describe and distinguish the concepts and to illustrate their current usage.

Keywords Abolishing operation · Establishing operation · Interbehaviorism · Motivating operation · Radical behaviorism · Setting event · Setting factor

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In 1938, Skinner introduced the operant as a three-term contingency. Behavioral scientists have long recognized that in addition to stimuli within the three-term contingency, there are other events that may impact the probability of a response (e.g., illness, sleep deprivation). Early efforts to address these motivational influences on behavior included the concepts of drive, deprivation, satiation, among others (Miguel, 2013). For the last half-century or so, behavior analysts have generally used two different terms to speak about these events: *setting event* and *motivating operation*. The purpose of this article is to describe and distinguish these two concepts and to illustrate their current usage.

The setting factor concept was introduced by Kantor (1959) and represents the first extensive behavioral treatment of motivational events. Although the concept was

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introduced in 1959 as the setting factor, it was promptly changed to “setting event” (e.g., Bijou and Baer, 1961) and will be referred to as such from this point forward. Kantor described setting events as antecedent factors that are broader (e.g., temporally distal events) and more complex than discrete stimulus variables (e.g., food, light). His characterization of the setting event included an organism’s health and fitness, its behavioral history, its surroundings, among others. Bijou and Baer (1961) extended the setting event concept by describing it as a stimulus that impacts subsequent stimulus-response relations. A contemporary example of the use of the setting event concept is illustrated by McLaughlin and Carr (2005) who characterized the *quality of rapport* between caregiving staff and clients with developmental disabilities as a setting event that might influence rates of problem behavior. The authors used a functional analysis to demonstrate that poor rapport was causally related to increases in problem behavior. This relation was then used to develop a rapport-building staff training intervention.

The motivating operation (MO) concept (originally termed the “establishing operation”) was introduced in 1950 by Keller and Schoenfeld but was substantially redefined and expanded by Michael (1982). Michael’s (2007) most recent conceptualization of the MO is an environmental variable that momentarily changes the value of a consequential stimulus (e.g., reinforcer, punisher) *and* changes the probability of members of that functional response class. Over the years, the MO concept has been expanded to include a taxonomy of unconditioned and conditioned types (Michael, 1993) and technical terms for the MO’s various effects (i.e., establishing, abolishing, evocative, abative; Laraway et al. 2003). Thus, the MO is an omnibus term that subsumes the establishing operation (EO) and abolishing operation (AO).¹ A contemporary example of the use of the MO concept is illustrated by Groskreutz et al. (2014) who taught children how to request that an aversive activity be terminated (i.e., negatively reinforced mands). The authors demonstrated that such responses were rarely emitted in the absence of aversive stimuli or in the presence of preferred stimuli, even when activity escape was available as a consequence. Thus, the authors conceptualized the aversive characteristics of the activities as MOs because they increased the value of escape as a reinforcer.

Although both the setting event and MO concepts still appear in the contemporary behavior-analytic literature and were designed to address the same antecedent phenomena that impact operant contingencies, the concepts are quite different. The setting event concept originated within the theoretical system of interbehaviorism and is topographically defined. That is, setting events are defined based on their physical properties and temporal relations to subsequent behavior. This topographical approach to the setting event is not surprising because the stated purpose of interbehaviorism is to provide a descriptive account of behavioral phenomena (Kantor, 1953). The aforementioned conceptualization of rapport as a setting event by McLaughlin and Carr (2005) illustrates the topographical or structural aspects of the concept. The authors sufficiently defined rapport and illustrated its functional relation to problem behavior. However, the value- and behavior-altering effects of rapport were unknown; thus, insufficient information exists to classify rapport as an MO. By contrast, the concept of the MO originated within the theoretical system of radical behaviorism and is functionally defined. In other words,

¹ The term motivating operation (MO) will be used from this point forward to refer to all three terms in Michael’s taxonomy: motivating operation, establishing operation, and abolishing operation.

Fig. 1 Cumulative peer-reviewed journal articles per year that included the terms *setting event* (or setting factor) or *motivating operation* (or establishing operation or abolishing operation) in their titles or abstracts according to the PsycINFO® and ERIC® databases

events are only classified as MOs when they meet the value- and behavior-altering features of its definition. Thus, a greater evidential requirement exists to classify an event as an MO than to classify it as a setting event. This functional approach is consistent with the goal of radical behaviorism, which is the prediction and control of behavior (Skinner, 1953). The aforementioned conceptualization by Groskreutz et al. (2014) of task aversiveness as an MO (specifically an EO) illustrates the functional nature of the concept's definition because the experimental preparation was able to demonstrate, at a minimum, the value-altering effect of task aversiveness on escape as a negative reinforcer. Interestingly, task aversiveness can also be described as a setting event because it meets the concept's lesser requirement of a demonstrated relation to behavior.

In considering the relative utility of the two concepts, an assessment of their usage is warranted. We conducted advanced searches of the PsycINFO® and ERIC® databases to identify longitudinal trends in the usage of each term. Between 1982 and 2014, 120 publications made use of the MO concept² and 53 publications made use of the setting event concept³ (see Fig. 1). Annual usage rates of the setting event concept have remained stable at 1.5 publications per year since 1982. Interestingly, the majority of publications (71 %) that mentioned the setting event concept were published in the positive behavior support area (i.e., the article also included the phrase “positive behavior support”). Not surprisingly, annual usage rates of the MO concept were quite low in years subsequent to its introduction in the literature, however, since 2004 usage rates have substantially increased to 8.7 publications per year. A review of all editions of three behavior-analytic textbooks revealed that an earlier edition included both concepts (i.e., Cooper et al. 1987; Miltenberger, 1997; Sulzer-Azaroff and Mayer, 1991); however, the setting event concept was removed in subsequent editions (i.e., Cooper et al. 2007; Miltenberger, 2001; Mayer et al. 2012). In addition, a review of the index of terms in the

² The search terms were *motivating operation*, *establishing operation*, or *abolishing operation* appearing in titles or abstracts.

³ The search terms were *setting event* or *setting factor* appearing in titles or abstracts.

recently published *Handbook of Behavior Analysis* (Madden, 2012) included the MO (referenced in multiple places) but did not include setting event. Based on the relative prevalence of the MO concept in the contemporary behavior-analytic literature, it is apparent that this concept is now the predominant treatment of motivational events in behavior analysis (see also Laraway et al. 2014).

Conclusion

The truth criterion in behavior analysis is effective action (Skinner, 1945; Tourinho and Neno, 2003). As applied to technical terminology used by behavior-analytic scholars, we suggest that concepts should be retained over time instead of alternatives when they lead to more effective ways to address scientific and practical problems (see Leigland, 1984). The increasing prevalence of the MO concept in our literature in relation to the setting event concept, along with the alignment of the MO's functional definition with existing behavior-analytic terminology, might suggest that it has been a more effective term in behavior-analytic scholarship than the setting event. However, the changes in terminology could be a function of variables (e.g., an author's academic lineage) other than effectiveness.

In conclusion, the setting event and MO concepts were attempts to account for the same motivational phenomena but from two distinct theoretical perspectives. Currently, however, the MO concept is substantially more prevalent in the contemporary behavior-analytic literature, which is not surprising given the functional nature of the concept. The use of the MO concept should be expected to continue and the concept itself extended as long as its utility is maintained. However, should new concepts (e.g., Whelan and Barnes-Holmes, 2010) be introduced that prove more useful, we would predict a corresponding change in the verbal behavior of behavior analysts.

Conflict of Interest The authors declare that they have no competing interests.

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