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RECENT RESEARCH ON THE HIGH-PROBABILITY INSTRUCTIONAL SEQUENCE: A BRIEF REVIEW

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The high-probability (high-p) instructional sequence consists of the delivery of a series of high-probability instructions immediately before delivery of a low-probability or target instruction. It is commonly used to increase compliance in a variety of populations. Recent research has described variations of the high-p instructional sequence and examined the conditions under which the sequence is most effective. This manuscript reviews the most recent research on the sequence and identifies directions for future research. Recommendations for practitioners regarding the use of the high-p instructional sequence are also provided.

Key words: compliance, high-probability instructional sequence, noncompliance

The high-probability (high-p) instructional sequence is an antecedent-based intervention used to increase compliance. It consists of presenting a sequence of instructions with which a participant is likely to comply immediately before presenting a low-probability (low-p) instruction (Mace et al., 1988). The development of the sequence was based on the theory of behavioral momentum, which suggests that increasing the rate of reinforcement in specific contexts (i.e., in the presence of specific discriminative stimuli) results in more resistance to change or greater response strength in that same context (Nevin & Grace, 2000). During the high-p sequence, compliance with several high-p instructions, and receipt of reinforcement contingent upon this compliance, may therefore increase compliance with the subsequent low-p instruction.

The high-p sequence has been shown to be effective with a variety of populations, including participants ranging in age from preschoolers to adults, as well as individuals with various diagnoses (Lee, 2005). It has also been used to increase compliance with a variety of low-p instruction categories, including academic instructions (Lee, Belfiore, Scheeler, Hua, & Smith, 2004), social instructions (Wilder, Majdalany, Sturkie, & Smeltz, 2015), instructions to increase food acceptance (Penrod, Gardella, & Fernand, 2012), and instructions related to medical tasks (Riviere, Becquet, Peltret, Facon, & Darcheville, 2011). Advantages of the high-p sequence over other methods of increasing compliance are that it doesn't require physical guidance and has been socially validated in an early childhood setting (Jung, Sainato, & Davis, 2008). Despite these successes, the high-p sequence is sometimes ineffective (Rortvedt & Miltenberger, 1994; Wilder, Zonneveld, Harris, Marcus, & Reagan, 2007). The purpose of this paper is to briefly review recent research on the high-p sequence, suggest directions for future research, and provide recommendations for practitioners.

Recent research has examined the necessity and quality of reinforcement delivered for compliance with high-p instructions during the high-p sequence. In a replication of Zuluaga and Normand (2008), Pitts and Dymond (2012) compared the effects of the high-p sequence with programmed reinforcement (praise and edibles following compliance with high-p instructions) and the high-p sequence

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without programmed reinforcement (no praise or edibles following compliance with high-p instructions) and found that compliance with low-p instructions was greatest when programmed reinforcement was delivered contingent on compliance with high-p instructions. Wilder et al. (2015) extended the findings of Pitts and Dymond by examining the effects of reinforcement quality following compliance with high-p instructions. Specifically, the experimenters compared praise (a less preferred stimulus for the participants) with edibles (a more preferred stimulus for the participants) when reinforcing compliance with high-p instructions. Edibles increased compliance with the low-p instructions, whereas praise did not, despite both stimuli functioning as reinforcers in a previous reinforcer assessment using an arbitrary response. Taken together, these results suggest the importance of not only reinforcing compliance with high-p instructions during the high-p sequence, but also ensuring that the reinforcers being delivered are highly preferred. These findings are consistent with behavioral momentum theory: Any manipulation that enhances the value of reinforcement may strengthen both response rate and resistance to change, which increases a behavior's momentum (Nevin & Grace, 2000). Of course, additional topics, such as the optimal reinforcement schedule and the optimal magnitude of reinforcement delivered contingent upon compliance with high-p instructions, need examination.

In addition to investigating the delivery of reinforcement for compliance with high-p instructions, Pitts and Dymond (2012) and Wilder et al. (2015) also examined the duration of the inter-instruction interval (i.e., the time between each high-p instruction as well as the last high-p instruction and the low-p instruction). Most of the existing high-p research has not specified the interval used, yet it may be an important factor in the effectiveness of the sequence. Pitts and Dymond found that the high-p sequence was more effective when a 5-s, rather than 10-s, interval was used. Wilder et al. (2015) found that a shorter interval of 1–2 s was also effective; however, more research directly comparing varying interval durations is needed.

Other recent research suggests that the topography of the high-p instructions may influence the effectiveness of the high-p sequence. Esch and Fryling (2013) examined two variations of the high-p sequence: one that used maintenance (i.e., previously learned through direct instruction) high-p instructions (e.g., "Sit down"), and one that used leisure-based high-p instructions (e.g., "Turn on the movie"). The results suggested that although both leisure and maintenance high-p instructions increased compliance with the low-p instruction, the largest increases in compliance with the low-p instruction were observed with the leisure instructions. The authors suggested that the topographic similarity of two of the three high-p instructions in the leisure high-p sequence to the low-p instructions might have been responsible for the increased compliance; the topographically similar instructions involved physically manipulating a toy car and pushing the on/off button on a television. Of course, it is possible that high-p instructions that have historically involved access to (presumably) preferred activities, such as those delivered by Esch and Fryling in the leisure condition, produce greater compliance than high-p instructions that do not involve access to preferred activities. More research is necessary to determine the effect of topographically similar high-p instructions on compliance with low-p instructions. For example, research could compare the effectiveness of motor (e.g., "Give me five") and vocal (e.g., "Who is your teacher") instructional high-p sequences to increase compliance with motor and vocal low-p instructions. It is possible that high-p instructions that are topographically similar to the low-p instruction will produce more

compliance than high-p instructions that are topographically dissimilar to the low-p instruction.

Other research has examined stimuli which influence compliance with high-p instructions. Normand, Kestner, and Jessel (2010) evaluated the high-p sequence to increase compliance by a preschool boy. When the participant stopped complying with the high-p instructions, the researchers removed a stimulus (a toy chest) associated with the low-p instruction, "Put your toys away." In the absence of the toy chest, compliance with high-p instructions increased. When the toy chest was reintroduced, compliance with high-p instructions decreased. Unfortunately, due to the request delivered in the low-p instruction, Normand et al. could not evaluate the effect of removing the toy chest on compliance with the low-p instruction. Nevertheless, when compliance with the high-p instructions begins to diminish within the high-p sequence, researchers and practitioners might consider removing stimuli associated with the low-p instruction and then representing the high-p instructions followed by the low-p instruction.

One recent study examined the extent to which it is possible to fade the number of high-p requests delivered as part of the high-p sequence. Axelrod and Zank (2012) trained general education teachers to use the high-p sequence with two students. A 3:1 high-p sequence (i.e., three high-p requests to one low-p request) increased compliance with low-p instructions, and compliance maintained at similar levels for one participant when the high-p sequence was faded to 1:1. However, for the other participant, compliance with low-p instructions decreased during the 1:1 condition and decreased further during the maintenance condition. Belfiore, Basile, and Lee (2008) were also able to fade the number of high-p instructions from four to one. In both of these studies, the researchers faded the high-p sequence between (as opposed to within) low-p tasks. More research is needed on the maintenance of high-p sequence effects, as well as the feasibility of fading the number of high-p requests, as both of these topics have implications for the adoptability of the high-p sequence as an intervention.

Researchers have also recently examined whether it is even necessary to present high-p instructions to ultimately increase compliance with a low-p instruction, or if the simple response-independent delivery of preferred items will increase compliance. In a replication of Bullock and Normand (2006), Normand and Beaulieu (2011) examined the fixed-time (FT) delivery of preferred items before presentation of a low-p instruction across three instructions. Results showed that FT delivery of preferred items increased compliance for one instruction for each of two participants. These results suggest that the delivery of preferred items, independent of the delivery of high-p instructions or compliance with high-p instructions, can be sufficient to increase compliance with low-p instructions in some circumstances. The one instruction for which the FT delivery of preferred items was ineffective (i.e., "Give me the game") differed from the other two instructions in that noncompliance resulted in prolonged access to a preferred activity (i.e., the game). This suggests that the topography of the low-p instruction may also be an important consideration. Future research should continue to examine the efficacy of the high-p sequence when it is applied with a wide variety of low-p instructions.

Finally, recent research has also examined the high-p sequence combined with other interventions. Penrod et al. (2012) used the high-p sequence and demand fading to increase bite acceptance with two young children who exhibited food selectivity. They used high-p instructions (e.g., touch the food, smell the food, lick the food) that were successive approximations to the terminal response of swallowing the food. Both participants

eventually consumed the bites of food. Dawson et al. (2003) found that the high-p sequence was effective when combined with escape extinction (EE) in treating food refusal exhibited by a young girl. However, the high-p sequence was ineffective when evaluated alone. Subsequently, Patel et al. (2007) found that the high-p sequence was sufficient and that EE was not necessary to increase compliance with instructions to eat in a child with food refusal. Penrod et al. noted that the severity of food refusal varied among participants in these studies, which could account for the discrepant findings.

Recommendations for Practitioners

Based on the recent literature, we recommend the following when using the high-p sequence. First, the high-p instructions should be empirically identified before using the procedure (Belfiore et al., 2008). Second, the intertrial interval should be 1–5 s (Pitts & Dymond, 2012). Third, high-quality reinforcement should be delivered contingent on compliance with high-p instructions (Wilder et al., 2015). Fourth, if the participant does not comply with high-p instructions, stimuli associated with the low-p instruction should be identified and eliminated (Normand et al., 2010), or other high-p instructions should be used. Fifth, reinforcement should be delivered contingent upon compliance with the low-p instruction. Finally, if the procedure is ineffective, practitioners should consider adding an additional intervention component (Dawson et al., 2003; Penrod et al., 2012).

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