The Effects of Hypnosis on Flow States and Performance

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Abstract

This study examined the effects of hypnosis on flow states and short-serve badminton performance in 4 competitive female players. The investigation utilised an idiographic single-subject multiple baselines across subjects design combined with a procedure that monitors the internal experience of the participants (Wollman, 1986). The method of intervention utilised in this study involved hypnotic induction, hypnotic regression and trigger control procedures. The results indicated that all 4 participants increased their mean short-serve performance from baseline to intervention. Three of the 4 participants also increased their mean flow scores and indicated that during the intervention phase they had felt more relaxed, calm, determined, happy and focused when compared to the baseline phase.

Introduction

Elite athletes frequently report that a mental state described by Csikszentmihalyi (1975) as flow is an important construct underlying their successful athletic performances (Jackson, 1999). While there is much anecdotal and qualitative evidence supporting this conjecture (e.g., Ravizza, 1984), empirical evidence is rare (Jackson and Czikszentmihalyi, 1999). Quantitative research has lagged behind experiential awareness of flow given the inherent difficulties of applying empirical methods to phenomenological experiences. Recently, Jackson and Marsh (1996) have helped to resolve this problem by developing a psychometrically valid and usable scale for assessing flow in sport and physical activity. Specifically, the Flow State Scale provides a global quantitative measure of the flow experience or single quantitative measures of nine distinct components of flow.

The components of flow identified by Jackson and Marsh (1996), include Challenge and Skill Balance, Action and Awareness Merging, Clear Goals, Unambiguous Feedback, Concentration on the Task at Hand, Paradox of Control, Loss of Self-consciousness, Transformation of Time and Autotelic Experience. This scale has facilitated new interests in flow research (see for example Catley and Duda (1997) by allowing a quantitative examination of the relationship between flow and performance.

Most applied sport psychologists tend to utilise a variety of methods and techniques to assist players in reaching flow and maximising their athletic performance (Hardy, *et al.* 1996). Goal-setting (Kingston and Hardy, 1994), imagery (White and Hardy, 1995), relaxation (Jones, 1993) and self-talk (Weinberg and Jackson, 1990) are but a few of the techniques employed. These techniques are popular because they are effective and relatively simple to perform. They are also well established and their use in sport is supported by the research literature. To date most applied sport psychologist employ an educational philosophy in an attempt to teach athlete's these mental skills. However, the reliance on using an explicit learning approach, that is learning in which knowledge is accumulated with the learner being able to verbally explain or label knowledge, may have some adverse effects on performance. Indeed, Masters (1992) has shown empirically that golfers exposed to explicit learning strategies will perform worse in stressful conditions than golfers who learn skills implicitly. To explain his findings Masters (1992) has suggested conscious processing of explicit knowledge results in a disruption to the automaticity of a movement because participants are less able to invest cognitive resources into the skill. Support for this conjecture has now come from a number of more recent studies from the sport psychology literature (see for example Hardy, *et al.* 1996). Taken together, their findings imply that any performance intervention may have an adverse effect upon performance during stressful conditions if it requires conscious processing. This conclusion might explain why there have been some inconsistent findings surrounding the use of Goal setting (e.g. Burton, 1989), Imagery (e.g. Mumford and Hall, 1985) and Self-talk (e.g. Dagrou *et al.* 1991). This conjecture is not meant to apply that we should stop using these techniques in applied sport psychology. However, we should be aware that they may have adverse effects on athletes who have a tendency to be over analytical about their performance when confronted with a stressful situation.

From the coaching literature, the ability of athletes to lower their critical logical conscious barriers has long been recognised as important in playing competitive sport (see Gallwey, 1974). If one takes the position that explicit learning or conscious processing thwarts peak performances, it follows that one must give athletes a different learning device. It may be advantageous if implicit or unconscious learning strategies are given to athletes rather than strategies that facilitate the control of behaviour through conscious, cognitive mechanisms.

Interestingly, Wolberg (1964) and later Taylor, *et al.* (1993) have suggested that hypnotic protocols may be a useful strategy for bypassing conscious processing. Research supporting this conjecture has come from a number of psycho-physiological studies showing EEG activity shifts from the left (analytical verbal and conscious side of the brain) to the right hemisphere (holistic, nonverbal, imaginative side of the brain) during hypnosis (see Gruzelier, *et al.,* 1991; Gruzelier and Warren, 1993). In spite of these findings research into the effects of hypnosis on athletic performance has produced mixed results. This is largely due to many of these studies lacking methodological rigour (Taylor *et al.,* 1993). Whilst some contradiction is evident in the literature, it does seem reasonable to assume that hypnosis interventions may enhance performance, provided athletes can utilise the technique during performance. Recently, Pates *et al.* (2000) have suggested that hypnotic techniques may be implemented by athletes during an event with the use of trigger control techniques. Triggers are words, sounds, images or a natural part of a routine that one can do or think about in order to induce a response usually obtained during the induction phase of the hypnotic procedure. Unestahl (1983, 1986) has implied that sport psychologists may use two types of triggers for applied work. The first are 'Natural triggers' which are usually part of a normal routine (e.g. holding a racket) the second are 'artificial' triggers' which do not form part of a normal routine (e.g. a word). Unestahl (1983, 1986) also advocated the use of other techniques such as hypnotic regression. Hypnotic regression involves the reliving of an early life experience with no conscious awareness of any future realities beyond the time frame being experienced. It utilises a complete dissociation from any other reference to the present and as a result of the change in perception the rekindling of the participants experiences are more kinesthetic and emotive (Hammond, 1990). During the regression Unestahl (1983, 1986) conditioned positive emotions such as ideal performance feelings to a trigger that would allow access to the optimal performance experience during a future event. Hence when the trigger was initiated the conditioned ideal performance state was produced.

Although, Unestahl (1973, 1975, 1983, 1986) has only presented case studies and anecdotal evidence to support the use of these techniques in sport, recently, Pates and Maynard (2000) adopted Unestahl's techniques using more rigorous methodological procedures. Specifically, Pates and Maynard (2000) utilized an idiographic single-subject replication-reversal (ABA) design to analyze the effects of hypnosis, regression and ‘artificial’ trigger control techniques on chipping performance and flow states in golfers. Their findings revealed that performance and cognitions associated with flow states were elevated using these techniques.

The current study will extend the work of Pates and Maynard (2000) by evaluating the effectiveness of a hypnosis intervention in facilitating flow states and performance accuracy in badminton short-serves. It is perhaps worth noting that this study broadens Pates and Maynards (2000) work in a number of important ways. The first is the analysis of a racket sport performance, which is rarely reported in the conscious processing or mental training literature. The second difference is the utilisation of a ‘natural’unconscious trigger in the hypnotic protocol, and the third the use of a single-subject multiple baseline design which demonstrates the external validity of an intervention in the sense that the results can be generalised across participants.

It was expected that during hypnosis the player's best performance could be conditioned to a 'natural' trigger. It was then hypothesised that after conditioning, players using the 'natural' trigger would experience more intense states of flow and achieve improved accuracy in the performance of the badminton task. In the present study a 'natural' trigger was used because the researchers wanted to demonstrate the effects of a trigger that requires no conscious control. A single-subject multiple baselines across subjects design was deemed the most appropriate method to study the effects of the intervention because it allowed the analysis of an intervention that cannot be withdrawn or 'turned off' (Hrycaiko and Martin, 1996). Based on the recommendations of Wollman (1986) and other researchers who have utilised single-subject designs (e.g., Lerner, *et al.* 1996; Swain and Jones, 1995), the present study also applied a procedure that monitored both flow states and the internal experience of each player.

Method

Participants

The participants were four members of a female University Badminton team located in the North of England. All participants were aged between 19 and 25 years with a mean age of 21.25 years (SD = 1.6). The participants were regular first team players with at least 4 years of competitive experience. None of the players had previous experience with hypnosis training methods. Prior to the study the participants were informed of the nature and extent of the investigation, and all agreed to participate.

Experimental Design

A single-subject multiple baselines across individuals design was implemented to examine the effects of a hypnosis intervention on flow states and badminton serve performance. This type of design allows participants to serve as their own source of control for the experiment (Barlow and Hersen, 1984; Hrycaiko and Martin, 1996). This format was also most appropriate because it facilitates the analysis of the effects of an intervention that could not by nature be withdrawn from the participants due to the use of 'natural' trigger control techniques (Barlow and Hersen, 1984). With this design data are taken across several participants concurrently. The intervention is then introduced to the first participant while the other participants remain on baseline. Then in a staggered fashion across the remaining participants, the intervention was established. Specifically, the first participant was given hypnosis training after 4 baseline trials, the second participant after 6, the third after 7 and the fourth after 9. However, the intervention was only initiated when a stable baseline or a trend in the opposite direction of the change anticipated became apparent for each of the participants (see Hrycaiko and Martin, 1996). Based on the recommendations of Barlow and Hersen (1973, 1984) and Kazdin (1992) data was collected on 11 occasions over about 12 weeks.

Dependent variables

Badminton serve. The badminton short serve was selected as a criterion task because participants were familiar with the technique and it reflected an important component of their performance. It is also a good example of a closed skill. These are skills in which the environment is not changing and the performer can plan the movement well in advance (Schmidt, 1982). To maximize effort and motivation as well as provide conditions normally experienced during a competition, a prize was awarded to the player who displayed the best average performance score over 11 trials. Before each performance trial the scoring system and procedures were explained to each of the badminton players. Each of the participants were then asked to warm-up and perform ten practice shots at the target to familiarize themselves with the task. The participants used a regulation racket and feathered shuttles. All serves scored were legal according to the rules of badminton. That is, the shuttle had to be contacted below the waist of the server with the racket head below the hand (Poole, 1969). The short serve was assessed using a method adapted from Goode and Magill (1986). Specifically, in the right service court markings were drawn 10cm wide in the form of arcs at distances of 10, 20, 30, 40 and 50cm from the intersection of the centerline and the short service line. The distances were scored 5, 4, 3, 2, and 1 respectively. Any shuttle landing on a line received a higher score; any shuttle landing outside the target area received a score of zero for that trial. The trial was terminated when all had completed twenty serves. A sum of the twenty serves was the score for each performance trial which lasted approximately 10 minutes, Flow State Scores and information on the internal experience of each player during performance were collected.

The reliability of the performance observations was assessed by comparing the judgements of two independent 'blind' observers, simultaneously measuring the target behaviour. The reliability assessment took place prior to the study and resulted in a correlation of 1.00 for the scores of the two independent observers.

Flow Analysis

In addition to the performance data, information on the frequency and intensity of flow experience was assessed using the Flow State Scale (FSS) Jackson and Marsh (1996). This 36-item instrument provides a quantitative measure of the nine dimensions of flow outlined by Csikszentmihalyi (1990). The dimensions measured by this instrument are: challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, concentration on task at hand, sense of control, loss of self-consciousness, transformation of time and autotelic experience. The internal consistency estimate for the nine FSS scales were alpha M = .83. For the purpose of this investigation a single global FSS score was collected from the four participants after each of the eleven trials. A global measure of flow was preferred in this investigation because of Jackson's (1999) contention that single factor approaches tend to reveal complete information about the total flow experience. Alphas for the nine FSS scales range from .72 to .91 (Jackson, Kimiecik, et al.1998).

Treatment: The Hypnosis Intervention

The training of the participants in hypnosis took place immediately after the completion of the final trial of baseline testing and was divided into two stages. An investigator who had successfully completed extensive training in a variety of hypnosis techniques delivered the intervention. In the first stage of the intervention participants were encouraged to sit in a comfortable position and then were asked to focus on their breathing. Specifically, they were instructed to breathe deeply and to release air slowly while counting backwards from the number ten. They were then given a 15-minute session involving progressive muscular relaxation (PMR). The technique originally pioneered by Jacobson (1938) involved the badminton players tensing and relaxing parts of their body, whilst deeply inhaling. Suggestions asking the participants to contrast the differences between the tense and the relaxed muscles were also given. The researcher utilised Ericksonian hypnosis throughout the induction and the trance was deepened using a staircase technique outlined by Hammond, (1990). The staircase technique consisted of a journey, one step at a time, down a flight of twenty stairs. As the participants took the journey they were told to see each stair in front of them and feel the stair under their feet. At the bottom of the stairs they were told they would see a door, and beyond the door they would see a room with a comfortable chair. The participants were then asked to sit down in the chair and focus on a small cinema screen on which appeared a relaxing scene. At this point the participants were instructed to direct their attention to situations that were associated with relaxation, for example, the images of a warm comfortable beach, or the sensation of floating in water. Throughout this stage suggestions were given to reinforce both the experience of the PMR and the deep breathing technique.

In the second stage suggestions were given to help the participants regress, and remember a polysensory experience of their best competitive performance. Specifically, they were asked to include visual, auditory, tactile, olfactory, gustatory, and memory of their best performance from an internal perspective. When a memory was accessed, a trigger was then introduced so an association was developed between the trigger and the variables responsible for the optimal performance. The trigger used was holding the badminton racket. The participants were then told to see themselves rising from the chair and proceed out of the door and up the staircase. As they ascended the staircase they were instructed to come out of trance and feel refreshed and alert. After waking from trance they were asked to access the ideal performance state using the trigger. Training was considered complete when the participants reported that emotions normally associated with their optimal performance could be experienced when they held the badminton racket.

Intervention Procedure

Based on Pates and Maynard's (2000) procedures, the hypnotic training was administered to the players in a small, quiet, and comfortable room and lasted approximately one hour. The training took place after the completion of the baseline trials. The training was composed of two stages: Stage 1-hypnotic induction, and Stage 2-hypnotic regression and trigger control. After the training, participants were asked to commit themselves to practice the techniques by playing a forty minute, audiotape recording of the 'live' session everyday, over a seven-day interval between the baseline and intervention phase of the study. The time period for the training was based on the recommendations of Pates and Maynard (2000) and Pates, *et al.* (2001). In total the players were given one live session, and seven audiotape sessions before the intervention phase. To ensure participants had listened to the audio tape recording, the players were contacted daily and asked to listen to the audiotape in a quiet room in the presence of an experimenter. The quality of the participants' experience was assessed by examining the thoughts, feelings and cognitions immediately after each session.

Following this training, the players began the intervention phase of the design. The players were instructed to imagine the trigger (holding their racket) each time they attempted a serve. After each performance trial, flow and the internal experience of each player was assessed using the FSS and Practical Assessment Questionnaire. It should be noted that during this stage players were not under hypnosis. Instead, they were merely using the trigger conditioned to the way they felt during their ideal performance.

Practical Assessment

In order to provide information about the effectiveness of the intervention, each of the participants completed a practical assessment questionnaire adapted from Kazdin, (1992) and Kendall, et al., (1990). The participants were asked the following questions: 'How did you feel during the performance?' 'What were you thinking during the performance?' 'Were there any outside thoughts distracting you?' 'Did you experience any problems?' 'What were your general beliefs about your performance?' and 'How much effort did you put into today's performance?'

Following the completion of the study, the participants were given a social validation questionnaire. The questionnaire was designed to provide information concerning the importance of the study and the effectiveness of the intervention. Specifically, the participants were asked the following questions: (a) Did you perceive the task to be important? (b) Were the procedures of the study acceptable? (c) Are you satisfied with the results? (See Hrycaiko and Martin, 1996).

Procedural Reliability Assessment

To ensure that participants received the same information throughout the study a number of strategies were employed. For instance, some of the sessions including a familiarisation session prior to the first data collection were conducted in a group. The sessions were delivered in a standardised protocol: (a) perform progressive muscle relaxation, (b) perform mental imagery relaxation, (c) perform staircase hypnosis induction, (d) perform hypnotic regression technique, (e) condition trigger to a flow experience, (f) have participants access their ideal performance state utilising the trigger, (g) have participants complete the FSS questionnaire, (h) to reinforce training give participants an audiotape recording of the hypnosis session (i) contact participants daily to check that they have played the audiotape recording of the training, (j) check that the audiotapes have been retrieved before the beginning of the second baseline, (k) ask if there are any questions, (l) copy questions down and answer them, (m) check understanding with participants. Verification that all aspects of the standardised protocol were consistently applied was obtained from an observer.

The internal experience of each player was monitored by asking each participant to complete a questionnaire after each testing trial. This information permitted on-going assessment of the quality of the participant's feelings, thoughts and cognitions across the baseline and treatment sessions. The data was analysed by comparing the comments obtained in the baseline sessions to the comments obtained during the intervention phase of the experiment.

Treatment of Data

The performance scores obtained from the participants were plotted according to the accuracy of their attempts. An effect was considered to have occurred when at least one of the following criteria has been reached : (a) when baseline performance was stable or in the direction opposite to that predicted for the effects of the treatment, (b) the greater the number of times that an effect was replicated both within and across participants, (c) the fewer the number of overlapping data points between baseline and treatment phases, (d) the sooner the effect occurs following the introduction of the treatment and, (e) the larger the size of the effect in comparison to baseline ((Barlow and Hersen, 1984; Hrycaiko and Martin, 1996).

Results

Upon receiving the intervention participants 1, 2, 3, and 4 experienced an immediate performance effect with only a few overlapping data points between the baseline and the intervention phase. Specifically, participant 1 improved from a mean score of 18 during the first baseline to a mean of 28 during the intervention phase, participant 2 from 14 to 22, participant 3 from 9 to 25, and participant 4 from 15 to 27. The performance data for each participant is presented in Figure 1. The results suggest that the hypnosis intervention consistently improved short serve performance accuracy.

During the intervention participants 1, 3, and 4 experienced an immediate flow effect with no overlapping data points between the baseline and the intervention phase. Specifically, participant 1 improved from a mean flow score of 91 during the baseline to a mean of 128 during the intervention, participant 3 from 116 to 137, and participant 4 from 89 to 145. Participant 2 did not experience increase in flow. Indeed, there were many overlapping data points between the baseline and intervention with a mean score of 116 recorded during these two phases. The flow data for each participant is presented in Figure 2. The results suggest that the hypnosis intervention consistently increased the intensity of the flow experience for participant's 1,3 and 4 but had no effect on participant 2.

Practical Assessment Data

Upon completing the study, each of the participants was asked to respond to a practical assessment questionnaire. Participant's 1, 3, and 4 indicated that during the intervention phase they had felt more relaxed, calm, determined, happy and focused when compared to the baseline phase and experienced reduced concerns about performing and more control over their serve. In contrast participant 2 indicated that during the intervention phase she had not noticed improvements in performance because she was worried about the competition and was distracted by others watching her serve. Finally, participants 1, 3 and 4 but not participant 2 reported that they were satisfied with the results of the intervention and recognised that it had improved their performance.

Discussion

The purpose of this study was to examine the effects of hypnosis on the performance of short serves and flow states in badminton players. The results of this study indicate that a hypnosis intervention consisting of a hypnotic induction, hypnotic regression and 'natural' unconscious trigger control techniques enhances performance. This finding supports previous research that found hypnosis is a useful tool for improving athletic performance (Baer, 1980; Liggett, 2000; Pates and Maynard, 2000; Schreiber, 1991; Unestahl, 1973; 1975; 1986). Three of the four participants also showed increases in flow during the intervention which suggests that in some players the intensity of flow in badminton may be increased using hypnotic regression and trigger control techniques. The results are clearly relevant to sport psychology practitioners because they suggest hypnotic training may increase personal control over flow and performance.

Perhaps the most important feature of hypnotic training that utilises 'natural' unconscious trigger control techniques is that once conditioning has taken place, processes important for optimal performance no longer need to be consciously controlled. This may lead to more attentional resources being available to the athlete, which may improve performance and allow flow to occur more often. Support for this conjecture comes from Masters (1992) who explicitly indicated that conscious control of a motor task disrupts automatic task processing and impairs performance. Clearly, the unconscious feature of hypnotic interventions is of value from an applied perspective as it provides the sport psychologist with a tool that does not constitute a conscious left hemisphere distraction for the performer.

Unfortunately, the mechanism by which hypnotic interventions increase performance and the experience of flow is not known. However, it is possible that hypnosis facilitates a shift from an analytical to a holistic style of thinking, which gives access to processes that are important for athletic performance (Crawford and Gruzelier, 1992). Alternatively, the effect hypnotic interventions have on flow and performance may be best explained by Norman and Shallice's (1986) cognitive model of behavioural control, which appears in the literature on cognitive psychology and neuropsychology.

The Norman and Shallice (1986) model proposes that the cognitive system is comprised of a large, distributed set of specialised processing systems under the guidance of a two-tiered cognitive control system. In routine situations, behaviours may be controlled exclusively by the operation of low-level cognitive control structures or schemata. These structures or schemata are triggered by cues in the internal and external environment in accordance with a contention scheduling mechanism, which operates automatically without consuming attentional resources. This low-level of control is considered to be an automatic process, requiring, neither attention, awareness, nor volition for its operation.

According to Woody and Bowers (1994) hypnosis represents one situation where the supervisory system of control is inhibited, leading to the hypnotised individual's over-reliance on situational cues for determining subsequent behaviour. The resulting behaviours may then be perceived as occurring automatically and involuntary, because they have not been performed under conscious control (Woody and Bowers, 1994). This view has recently become particularly influential within contemporary hypnosis research underpinning the dissociated control theory view of Bowers (1992).

Interestingly, Hargadon *et al.* (1995) have suggested that the ability to become intensely absorbed in a given experience is another situation by which dissociated control might be induced. This suggests that any absorbing activity such as participating in sport may inhibit the supervisory system of control, leading to the athlete's reliance on situation cues for determining behaviour. Under these non-analytical conditions, an athlete's perception of behaviour may be altered resulting in performance that is best described as flow. Flow states and hypnotic states may be perceived as similar because the cognitive mechanisms that bring about their existence are the same. Evidence for this view, is provided by Unestahl (1983).

The dissociative control theory of hypnosis is still very much in the early stages of its development, and researchers must be relatively cautious when attempting to draw any firm conclusions regarding its use as an explanation of flow as experienced by many athletes. However, it represents a plausible cognitive theory explaining the hypnosis/flow/performance relationship. Furthermore, while retaining its cognitive basis, it acknowledges that environmental factors play an important role in the flow experience. Thus dissociative control theory accommodates Csikszentmihalyi's (1975) model of the flow experience which described flow as the balance between skill (action capabilities) and challenge (action opportunities). Moreover, it is based on a model of behavioural control developed within cognitive psychology and, on this basis, offers testable predictions with which to assess its validity.

An important aspect of this study was that the single-subject multiple baselines across subjects design enabled the experimenters to be more confident, that the change in flow and performance scores were produced by the intervention and not some other uncontrollable variable. Indeed, the introduction of the intervention in a staggered fashion and the demonstration of an effect when the intervention was introduced, gave a very clear demonstration that the intervention had some degree of external validity, in the sense that the results could be generalised across all three individuals. Additionally, the qualitative data revealed that during the intervention phase, three of the players were more relaxed, calm, determined, happy and focused. Three of the participants also reported having more control and reduced concerns about performing. These findings are entirely consistent with the research of Crawford *et al.* (1996), Damaser *et al.* (1963), Kihlstrom (1985), Kirsch (1994) and Wadden and Anderton (1982) who have clearly all demonstrated the positive effects of hypnosis on emotions, thoughts and perceptions.

It should be noted that the observed changes in flow were not always consistent with changes in performance. Indeed, during the intervention Player 2's performance scores improved but her flow scores did not. This finding is interesting since it is consistent with Jackson and Czikszenmihalyi's (1999) observation that high performance can occur in the absence of high flow.

There remains a possibility, of course, that the improvements in both performance and flow scores are an artefact of participant and experimenter bias. Indeed, neither the participants or experimenter were blind to the outcome and so experimenter expectations or the demand characteristics of the experiment could have affected the results. There also remains an issue of a possible Hawthorne effect, the change in performance that occurs merely as a function of being in an investigation (Drew, 1976). Scrutiny of performers in a single-subject experimental design might heighten this effect. Drew (1976) observed, however, the effect tends to decline as the participants become acclimatised so the extended length of the single-subject study could aid in controlling this effect. A further weakness of this study is the experiment may not generalise to game situations. Indeed, during competitions it is rare to attempt short serves without the pressure of an opponent. However, performing the task under competitive conditions strengthens the ecological validity of our findings.

In summary the present findings suggest that the intervention consisting of a hypnotic induction, hypnotic regression and trigger control techniques may enhance flow and the performance of short serves in badminton. Also the evidence suggested that hypnosis affects emotions, thoughts and perceptions. Further research is required, however, if hypnotic interventions are to be accepted by the sports and exercise science community. Specifically, more ecologically valid and group-based research methods would contribute to the knowledge base. Additionally, it should be recognised that the distance the shuttle passes above the net is yet another important characteristic of a badminton short-serve performance and should be considered when short-serve performance is examined in future research studies.

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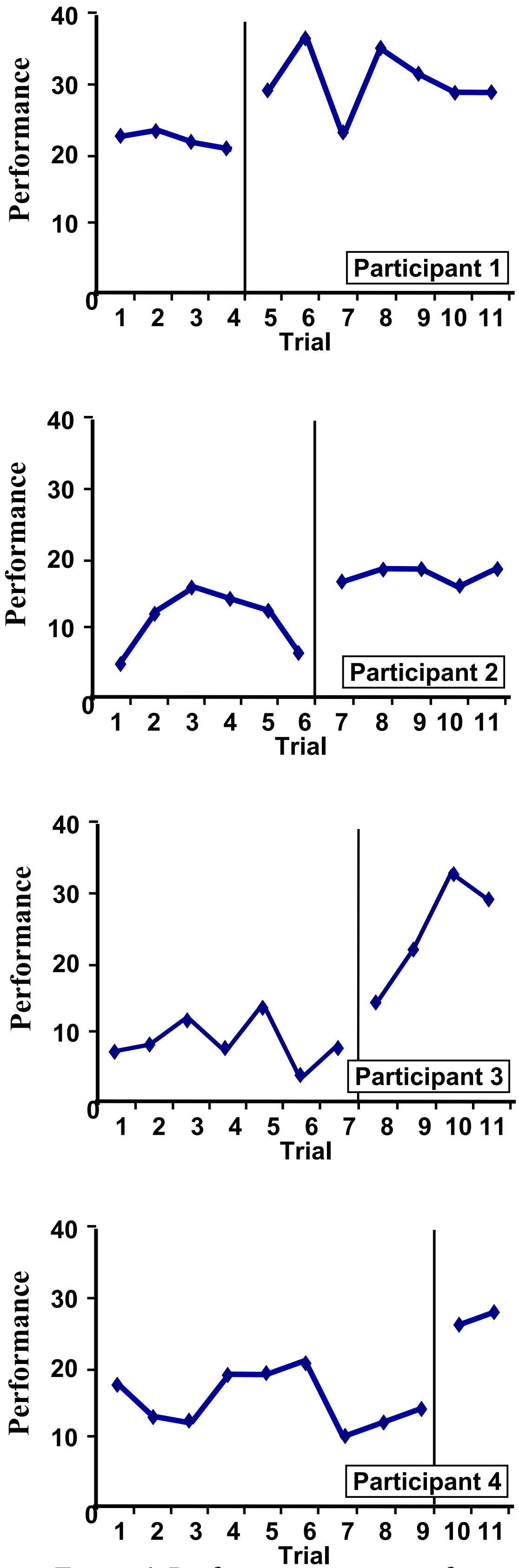

Figure 1. Performance accuracy for each participant on each trial.

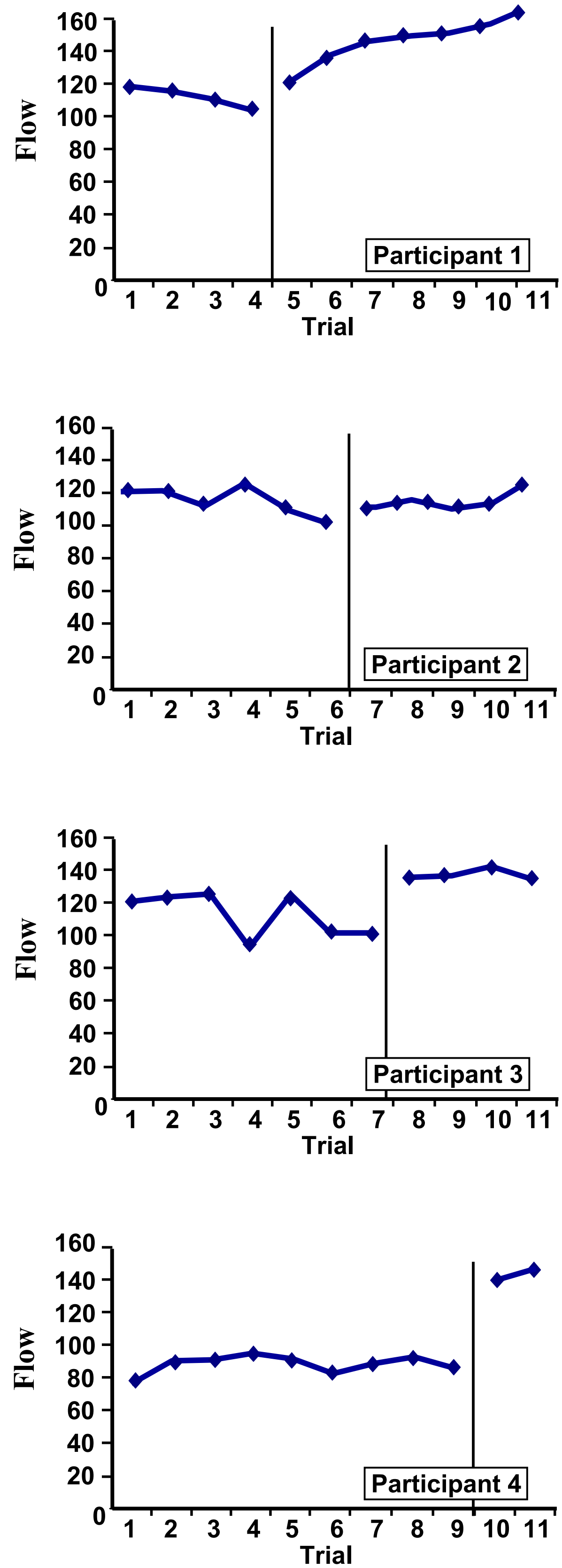

Figure 2. Flow scores for each participant on each trial