



ELSEVIER

Acta Psychologica 101 (1999) 315–337

acta
psychologica

A study of adaptive behavior: effects of age and irrelevant information on the ability to inhibit one's actions

K. Richard Ridderinkhof^{a,b,*}, Guido P.H. Band^b, Gordon D. Logan^c

^a Department of Developmental Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands

^b Department of Psychonomics, University of Amsterdam, Amsterdam, The Netherlands

^c Department of Psychology, University of Illinois at Champaign-Urbana, Illinois, USA

Abstract

In the study of adaptive behavior, the stop-signal paradigm provides a measure of the efficiency of response suppression that lends itself to examining the ability to inhibit one's actions, and two complementary types of factors that may influence that ability. Based on neurobiological considerations, age-related individual differences were hypothesized to be such a factor. In agreement with the cognitive-neuroscience literature, which emphasizes the relatively late maturation and early senescence of the (pre)frontal brain structures that are crucial for inhibitory control, results are reported of a study demonstrating that response inhibition in the stop task is subject to an unequivocal age trend during child development.

Stop task performance was hypothesized to be influenced further by the effects of irrelevant information. In a concurrent reaction time task, distractor stimuli may induce activation of an incorrect response. The subsequent inhibition of this incorrect response activation may interact with the suppression of responses in the stop task, if both are engaged simultaneously. Indeed, in a study designed to examine this prediction, the operation of response inhibition in the primary-task and stop processes affected one another negatively when distractors were associated with the incorrect response. © 1999 Elsevier Science B.V. All rights reserved.

PsycINFO classification: 2260; 2330; 2340; 2820

Keywords: Adaptive behavior; Response inhibition; Stop-signal reaction time; Choice reaction time; Age-related changes; Stimulus-response correspondence effects

* Corresponding author. E-mail: op_Ridderinkhof@macmail.psy.uva.nl

1. Introduction

Continuously changing events in an individual's environment place rapidly alternating demands on the individual's adaptive behavior. The capability to adjust one's actions dynamically by generating appropriate responses while at the same time maintaining coherent, goal-directed behavior, includes the capacity to stop, that is, to refrain from executing an intended or programmed action when some last-moment information calls for it. A popular illustration of this form of inhibitory control is that of the baseball hitter. In response to the pitcher's action, the hitter programs the parameters of a mighty swing, and enters the initial stages of executing the movement. However, when at the last moment the ball curves away from the plate, in a split-second the hitter decides to check his swing.

An experimental task that has been developed to examine these inhibitory aspects of adaptive behavior under controlled circumstances in the laboratory is the stop task (Lappin & Eriksen, 1966; Logan, 1994; Logan & Cowan, 1984). In this computer task, subjects are presented with stimuli whose identity designates a speeded response with one of two effectors, as in a regular binary choice reaction task. However, on occasion, the stimulus is followed (at some variable interval) by a second stimulus, the stop-signal. The stop-signal is a control signal that makes the response inappropriate, and calls for adaptive behavior in the form of inhibitory control: It tells the subject to withhold that response. As will be described in some detail below, the stop-signal paradigm provides a measure of the efficiency of response suppression that lends itself to examining the ability to inhibit one's actions, and the factors that influence that ability. The methods and tools of the stop task have become popular over the last decade, particularly in clinical settings where the task is used to study inhibitory control in pathological groups suspect of inhibitory dysfunction or deficiencies in impulse-control (see, e.g. Daugherty, Quay & Ramos, 1993; Jennings, van der Molen, Pelham, Brock & Hoza, 1997; Oosterlaan & Sergeant, 1996; Schachar & Logan, 1990).

The primary aim of the present study is to identify factors that influence the ability to suppress one's actions in a stop task. We concentrate on two candidate factors: the effects of irrelevant information, and the effects of age. Disparate as these factors may seem to be, they share a fascinating property: they are among the few factors that can be argued to have the potential to influence the ability to stop, yet have rarely been observed to do so. In addition, these influences both are argued to involve mechanisms in which response inhibition plays a key role. We set out to clarify whether and how these factors influence the inhibition of actions in a stop task; such clarification can contribute new insights to theories of response inhibition and its role in adaptive behavior. Before reporting the present experiments and rationale, we will first discuss the stop-signal task and methodology in detail.

1.1. *The stop-signal paradigm*

In the stop task, choice reaction time (CRT) is recorded while subjects respond to the identity of a stimulus. On occasion, after some variable interval (the stop-signal

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات