How tablets can be used to study cognitive development: You can touch this

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ABSTRACT

Over the past ten years, new technology devices, in particular those with touch screen, have completely disappeared from society. Children are now practically surrounded by smart phones and iPads from birth. Despite being our regular companions, little is known about whether these instruments can be utilised to gather trustworthy scientific data in addition to just for amusement. For children aged 1 years to 10 years, who are typically too old for studies based on gazing times and too young for traditional psychophysical testing, tablets may be very helpful for gathering behavioural data. Here, we examined data from six studies that delivered developmental psychology experimental paradigms using touch-screen tablets. In experiments 1 and 2, we used a straightforward sorting and recall task with kids from 2 year old to 8 years old. Study 3 (ages 9 and 10) extended these tasks by making the stimuli more challenging and by including a perception task based on a staircase. In study 4 (age range: 2 years to 5 years), a visual search paradigm was applied, whereas in study 5 (age range: 1 years to 3 years), an extinction learning task was administered. In Research 6, we sought to learn more about the distribution of reaction times on touch displays across all ages by employing a straightforward visuo-spatial paradigm. In order to compare the results of the two studies, we also collected data from the adult participants. These data sets were examined in terms of four metrics: self-reported tablet usage, data completeness, response accuracy, and response timings. In conclusion, we discovered that kids as young as two are quite capable of engaging with tablets, are able to comprehend the relevant tasks, and are able to utilise tablets to register their replies appropriately. All studies' findings confirmed the benefits of tablet data collection, including its simplicity, portability, affordability, and high levels of kid engagement. We demonstrate the enormous potential of psychological research on young children using tablets and talk about methodological issues and possible solutions.

INTRODUCTION

New technologies are a constant companion in today's world. This is especially true of touch-screen gadgets like smartphones and tablets, which have practically become a part of our daily lives. This applies to everyone, not just grownups. Due to the lack of additional input requirements like mice or keyboards, children are not only fascinated by these devices but can also easily use them. For instance, Cristia and Seidl report that about a third of kids between the ages of 5 months and 11 months already interact with touch screens at least once per month. By the age of 3, this contact increases to almost 90%. Young children already possess the ability to tap (71%), flick (68%), drag (41%), and more. In fact, Abdul Aziz discovered that children as young as 2 years old can tap and drag, while children as young as 3 can rotate and flick, and children as young as 4 can easily carry out seven typical touch screen actions. While these studies concentrated on the overall usability of touch screens, other branches of science have taken a more focused approach to the use of touch-screen tablets. Couse and Chen argue that tablet interaction in the classroom is feasible in the context of education because kids between the ages of 3 and 6 are fo--und to be curious about the new technology and "persisted without frustration" when learning to use it. It's significant that this active interest actually seems to persist. When given more access to tablets, children between the ages of 3 and 5 showed improved letter sound and name writing skills, according to Neumann's research on the impact of tablet use on literacy knowledge. A study about the pro-social behaviour of kids with autism spectrum disorders indicated that having access to tablets was beneficial. They gave touch-screen-based applications to children with ASD (aged 5 to 14), and they discovered that just using the technology improved inter-child collaboration and gave ASD kids a fresh way to express their emotions. A tablet-based application was created with a broader focus on encouraging the integration of kids with mixed abilities when they play with kids without disabilities. In essence, they discovered that forced technology-encouraged interaction could enhance child-child cooperation. Standardized testing has already been used by touch-screen-mediated technology for a number of years to aid in these advancements. In general, touch screen technology and its impact on cognitive development and/or its usage as a knowledge mediator appear to be well received by both parents and scientists. In develop-

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-mental psychology, tablet-based research has the potential to close the methodological gap between traditional psychophysical experiments and video-based preferential gaze tasks. The former is frequently used with young children since they lack the motor skills needed to respond to stimuli in a consistent, clear, and quantitative manner. However, because these are only passive jobs, young children from the age of 2 and up quickly grow bored when they do them.

Additionally, response matching is a problem that frequently affects younger children when computerised measures are used to investigate problems in the field of perceptual development. Young participants frequently feel the need to physically look toward the input device and back onto the presentation device to match their response with the correct position on the monitor, which makes the process rife with errors when responding to a stimulus on the screen with a mouse click or key press.