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Editorial

Translational science and multitasking: Lessons from the lab for the everyday world

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ABSTRACT

This article is an Introduction to the Special Issue "Living in the 'Net' Generation: Multitasking, Learning, and Development". It provides an overview of the diverse contributions to the Issue that ties them together as examples of everyday multitasking. Common attention and cognitive processes that underlie the various activities are illustrated.

The notion of "translational science" had its origin in the field of medicine where the goal was to translate research from basic biomedical science into tools and interventions that could be used to diagnose, treat and prevent disease. Since then, translational research has moved beyond medicine and into other domains including psychological science. Experimental findings from cognitive science, behavioral neuroscience, psychopharmacology, behavior genetics, human factors and ergonomics, organizational behavior, decision-making, and developmental science have since led to interventions and innovations that enable children and adults to live healthier and more productive lives. The current multitasking work "zeitgeist" will also progress if we look to experimental psychology for answers to questions about its efficacy in the modern world.

Although multitasking has become ubiquitous, the issue of its effectiveness for work, learning, and play is contentious. One view is that multitasking enables the high-level efficiency and productivity that are essential for successful competition in contemporary business and educational environments. The basis of that argument is that multitasking promotes mental flexibility that can actually change the way in which the brain learns and retains information. Indeed, many multitaskers are highly confident that frequent switching among tasks and media types improves rather than diminishes their

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performance. This is believed to be especially likely among young children and teens who have grown up with technology and whose neural plasticity is relatively high. Alternatively, others contend that multitasking diminishes performance and leads to interference, distraction, and ultimately errors, lost time, stress, and anxiety; that it robs us of creativity and time for reflection. The evidence for that argument goes back to classical experimental literatures on divided attention, dual-task performance, and task switching dating to the 1930s – well before multitasking became a significant issue. The consensus of many studies over the years was that human information-processing is a limited capacity resource and is ill equipped to do several tasks at a time, either concurrently or in alternation. In that view, multitasking is likely to be especially problematic for children whose executive functioning and attention control are immature. Although the contexts for multitasking in young children is typically play, they are exposed to various media types from toddlerhood. Older children and teens spend about 8.5 hours daily using entertainment and social media, surfing websites, or texting and during much of that time they are also engaged in other activities. Consistent with this trend, schools are including multimedia and e-learning protocols into their teaching, perhaps without due recognition of the immaturities in attention and representational processes among the youngest users.

This Special Issue (Living in the "Net" Generation: Multitasking, learning, and Development) has been assembled in the interest of providing a middle ground and hopefully some insight on this complex debate. The goal is to provide a collection of some of the best thinking and research on the subject of "everyday" multitasking, with particular emphasis on its impact on children and youth, whose attention and cognitive processes are still developing. The definition of "everyday" multitasking is somewhat arbitrary, but refers to work, learning, and entertainment situations that we commonly experience in our daily lives. These contrast to the structured and formal laboratory tasks that have been used in the classic experimental literatures (e.g., dual task; task switching) and that have provided invaluable insights into the cognitive processes and resources that underlie multitasking. Among the key questions to be considered by the contributors to the Special Issue are: Is successful multitasking a reality or a myth? What tasks or conditions might lend themselves to successful multitasking? Who can multitask? Is learning more superficial when we multitask? Can the brain adapt to multitasking through practice and training? Should children be encouraged to multitask?

The first paper by Courage, Bakhtiar, Fitzpatrick, Kenny, and Brandeau provides a general overview of the multitasking phenomenon and an outline of the classical experimental literatures and how they are currently being adapted to examine everyday multitasking in the workplace, the classroom, the car, and during play. The authors provide an overview of the development of attention with special focus on the challenges that children's cognitive immaturity implies for multitasking. They also consider what is known and unknown about the impact of multitasking on learning and the brain. Finally, they draw on findings from cognitive and computational sciences to illustrate the modeling approach to predicting when and for whom multitasking will be successful. This first general paper in the Special Issue will be followed by more focused contributions in which key topics will be considered in greater detail.

The control and deployment of attention processes and the ability to resist distraction are central to effective multitasking. Rothbart and Posner provide an overview of the development of attention (alerting, orienting, executive control) and of the networks in the brain that underlie those processes. The primary control network for children from preschool age and for adults is the executive attention network that enables us to monitor and resolve conflict in planning, decision-making, error detection, and to inhibit inappropriate responses. It is especially critical to multitasking in that it allows stored information related to current goals to influence brain networks involved in the processing of more immediate information. It also plays a role in controlling distraction during task performance and in task switching. Although the capacity of executive attention is limited, especially in children, Rothbart and Posner make the case that the neural plasticity inherent in the brain makes it plausible that self-regulation and multitasking can be improved with attention network and brain state training. They also examine individual differences in attention network efficiency, sensation seeking, and effortful control that might reveal who chooses to multitask and how successful they will likely be. They note that the same processes that enable improved self-regulation might also underlie excessive multitasking and compulsive use of the Internet and other media.