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Worker, Interrupted: The Cost of Task Switching
BY KERMIT PATTISON 07-28-08

Fast Interview: When is interruption is helpful? Why can't most of us stay on task for more than three minutes? Is the best way to achieve flow to just unplug? Gloria Mark, Professor in the Department of Informatics at the University of California, Irvine, has some answers.

Why study interruption?

I became interested in it from my own personal experience. I moved here from Europe back in 2000. I was stunned by the amount of multitasking that I was doing here in the U.S. and I was wondering if other people were experiencing it as well. Anecdotally, people were reporting they were crushed by all of these different projects. People's lives as information workers involve different kinds of technologies, and they create even more of a force for interruption and different places where we can focus our attention.

Is this the downside of the communications revolution?

Interruptions aren't necessarily all bad. People report that some interruptions can be beneficial. The downside is the stress that comes from switching topics so rapidly throughout the workday.

How often is the modern office worker interrupted?

We had observers go into the workplace and we timed people's activities to the second. We've been to various workplaces, all high-tech companies. We wanted to look at information workers. We had observers shadow each person for three and a half days each and timed every activity to the second. If they pick up a phone call, that's the start time. When they put the phone down, that's the stop time. When they turn to the Word application we get the start time and stop time. We found people switched these activities on average of every three minutes and five seconds.

Roughly half of them are self-interruptions. That's to me an endless source of fascination: why do people self-interrupt? I do that all the time.

So it's not just somebody else interrupting us. You're working on a report and suddenly you check Orbitz for airfares — that sort of thing?

That's right. Or you go to eBay. For no apparent reason, the person picks up the phone and makes a call or starts surfing the Web.

When is interruption beneficial?

If an interruption matches the topic of the current task at hand, then it's beneficial. If you're working on task A and somebody comes in and interrupts you about exactly that task people report that's very positive and helps them think about task A.

There's been a lot of research into the psychology of problem solving that says if you let problems incubate, sometimes it helps in solving them. A good example would be a software developer who just can't trace a bug so they put it aside and let it incubate. The answer may come back to the software developer later while he or she is working on another task. This is an example of how switching tasks may be beneficial.

If interruptions are short they're usually not so bad. Imagine you're working on this article and some one comes in and says, "Here, can you sign this form?" You sign it, it's a very subordinate kind of task and you go back to doing your work. Any kind of automatic task that doesn't require a lot of thinking would not be a major disruption.

When is interruption counterproductive?

It's generally counterproductive if you're working on one task and you're interrupted on a completely different topic. People have to shift their cognitive resources, or attentional resources, to a completely different topic. You have to completely shift your thinking, it takes you a while to get into it and it takes you a while to get back and remember where you were.

You also found that people not only switched between small tasks but also between entire projects — a phone call and e-mail on one project, then jumping to a completely different topic.

We figured, maybe it's not so bad to switch activities within the same theme. We clustered events — a phone call, a Word document — into similar contexts that we called working spheres. We found that people switched those every 10 and half minutes. Say you're a financial analyst working on the TX project, then the BC project, then planning the company picnic and then going back and work on this original TX project.

Do you believe this behavior is typical of knowledge workers?

Yes. These were people who were managers, financial analysts, software developers. The only significant difference we found due to profession was that software developers spent a little bit more time on the PC before switching. But it's not even that much time — something like four minutes as opposed to three minutes. Other than that, we found no significant differences among professions.

How long does it take people to get back on task?

We found about 82 percent of all interrupted work is resumed on the same day. But here's the bad news — it takes an average of 23 minutes and 15 seconds to get back to the task.

What are the psychological costs of all this switching?

We found there is significantly more stress. We did a laboratory experiment where people did a typical office task: they had to answer a set of e-mail. In one condition, they were not interrupted. In another condition, we interrupted them with phone calls and IM. We used a NASA workload scale, which measures various dimensions of stress, and we found that people scored significantly higher when interrupted. They had higher levels of stress, frustration, mental effort, feeling of time pressure and mental workload. So that's the cost.

There was no significant difference in number of errors between those who were interrupted and those who were not. But I'll tell you something very interesting that we found — when people were not interrupted they worked slower. Here's how we interpret that — when people know they can expect interruption they get into a mode of working faster to compensate. You know you're going to be continually interrupted so you compensate by working faster, but the cost of that is stress.

How do you explain the stress?

It's a feeling of just not being able to keep up. There was very high powered lawyer on the east coast who told me that every Sunday morning he wakes up before the rest of his family, clears off the dining room table, lays out all his casework and spends the entire Sunday just catching up on what he wasn't able to complete during the week. That's another dimension — the inability to just get away from work and take a break. It's what I call invisible work: the work that your colleagues and managers don't see, the extra work you have to get done just to keep up with the demands of the workplace.

Are we becoming more superficial thinkers?

I argue that when people are switching contexts every 10 and half minutes they can't possibly be thinking deeply. There's no way people can achieve flow. When I write a research article, it takes me a couple of hours before I can even begin to think creatively. If I was switching every 10 and half minutes, there's just no way I'd be able to think deeply about what I'm doing. This is really bad for innovation. When you're on the treadmill like this, it's just not possible to achieve flow.

But many people tout the information revolution as a great spawning ground for creativity — we're coming into contact with new ideas, forging new connections, tapping into new networks. Do you buy any of that?

You have to put that in perspective. Let me give you an example. Eleven years ago I was a researcher at the Boeing company I studied a virtual world that was being deployed so people in the distributed company of Boeing would be able to meet others share expertise. It was basically like Second Life. We deployed this and we could not get anyone to use it. They went there out of curiosity and then they left and never came back. Eleven years later with Second Life, with all due respect, we're seeing exactly the same thing. People come, they're curious and then they don't come back.

Certainly, technology is giving us access to a lot more different people, but how many of these end up being quality relationships? That's the question we really have to ask.

You're the expert — how do you protect productive time?

I stay home. I do have to go into the university on some days but I try to schedule appointments so that I can stay home as much as I can, because that's the only way I'm not going to be interrupted.

What advice do you give to people who feel like they can't keep up?

Limit your web usage. Be disciplined. I am the most productive if I limit web usage to twice per day, once in the morning and once at night. To be more realistic, it's usually like four times a day that I check e-mail. If I do that, I can be really productive.

Be honest: have you been checking e-mail during this conversation?

I have to confess, I did once or twice.