Online Multitasking and User Engagement

Janette Lehmann[1], Mounia Lalmas[2], Georges Dupret[3], Ricardo Baeza-Yates[4]

1: Universitat Pompeu Fabra, Spain; 2: Yahoo Labs London;
3: Yahoo Labs Sunnyvale; 4: Yahoo Labs Spain

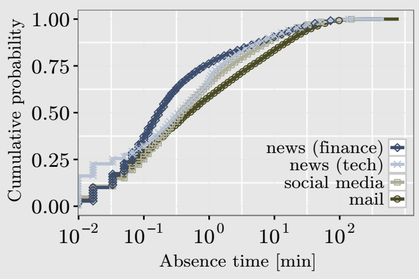
Users often access and re-access more than one site during an online session, effectively engaging in multitasking. We study the effect of online multitasking on engagement metrics designed to capture users browsing behavior with a site. We define metrics that characterize multitasking during online sessions and show how they provide additional insights to engagement metrics.

http://janette-lehmann.de

Characteristics and Effects

Visit and inter-visit activity

	#Visits	Absence time [min]
news (finance)	2.09 | 4.65	3.85 | 14.00
news (tech)	1.76 | 1.59	3.95 | 14.16
social media	2.28 | 4.78	4.47 | 14.11
mail	2.09 | 4.61	6.86 | 18.53



Multitasking depends on the site

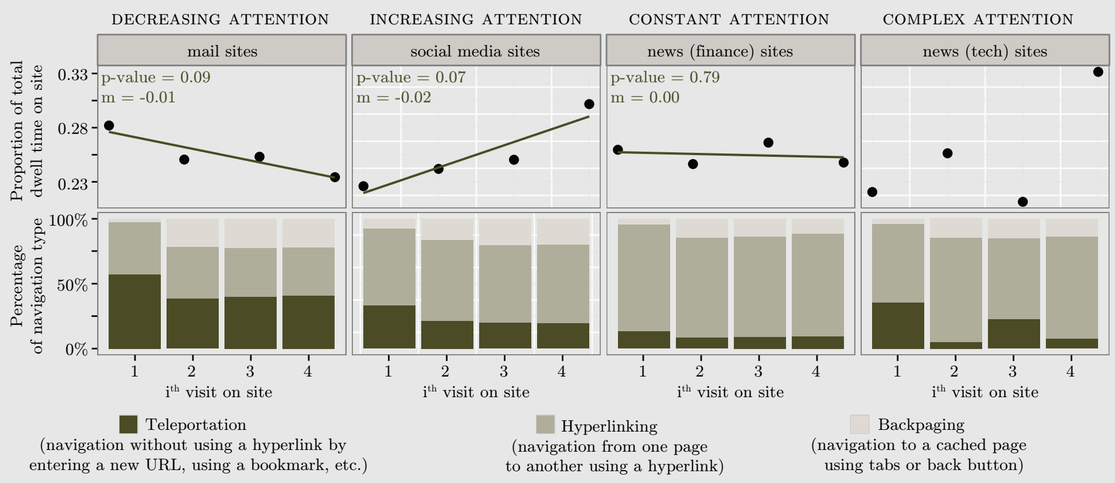
- Social media sites are revisited the most
- News (tech) sites are the least revisited sites
- Mail sites have the highest absence time between visits

Differences in the absence time

- 50% of sites are revisited after less than 1min
  - Interruption of a task
- There are revisits after a long break
  - Returning to a site to perform a new task

Activity pattern

- We identified four types of "attention shifts"
- Complex cases refer to no specific pattern or repeated pattern (e.g. always two visits belong together)
- Navigation type provides further information on whether users return to perform a new task or to continue with the same task

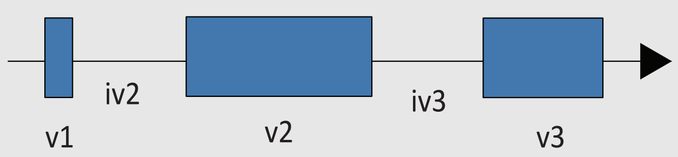


Measuring Multitasking

Cumulative activity

Assumption: Long inactivity between visits to a site is an indication of a high loyalty: the user is returning to perform a new tasks.

$$CumAct_{m,k} = \log_{10}(v_1 + \sum_{i=2}^{n} iv_i^k \bullet v_i)$$



v_i	Browsing activity during the i^{th} visit
iv_i	Browsing activity between the $(i-1)^{th}$ and i^{th} visit
k=2	Rescaling factor for iv_i
m	Browsing activity measure (e.g. dwell time, page views)

Attention shift and range

We use a modification of the "Inversion number" (inv) - a measure of sortedness.

$$AttShift_{m,n} = \frac{inv_{m,n} - \min Inv_{m,n}}{|\max Inv_{m,n}| - |\min Inv_{m,n}|}$$

$$AttRange_{m,n} = \frac{\sigma(V_{m,n})}{\mu(V_{m,n})}$$

n=4	Number of visits in session
σ	Variance in the visit activity
μ	Average of the visit activity

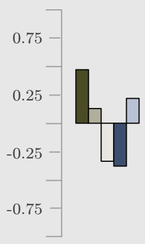
Attention shift \ *Attention range*	0	>0
-1	constant	decreasing
0	constant	complex
1	constant	increasing

Results

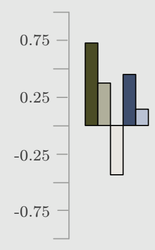
"Models" of sites using multitasking and standard engagement metrics.

Dwell time during a visit [min] | Dwell time during a session [min] | $CumAct_{dt,3}$ | $AttShift_{dt,4}$ | $AttRange_{dt,4}$

C1: 172 sites
mail, maps, news, news (soc.)



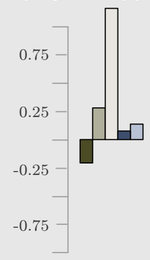
C2: 108 sites
auctions, front page, shopping, dating



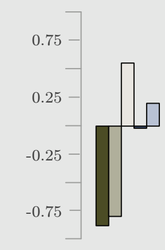
High multitasking effect

- High dwell time per visit and during whole session
- Users return to continue a task (short absence time)
- C1: attention is shifting to another site
- C2: attention is shifting slowly towards the site

C3: 156 sites
auctions, search, front page, shopping



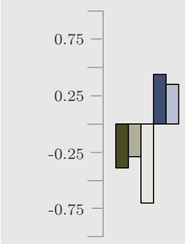
C4: 74 sites
front page, search, download



Several tasks during a session

- Users perform several tasks on these sites during a session
- No simple activity pattern
- C3: Dwell time per visit is low, but dwell time per session is high
- C2+C3: Browsing behavior can differ between sites of the same category

C5: 166 sites
service, download, blogging, news (soc.)



Sites with low activity

- Users do not spend a lot of time on these sites
- Time between visits is short
- Attention is shifting towards the site

Online multitasking affects the way users access sites – Standard metrics do not capture this!!!