

A Systematic Assessment of Smartphone Usage Gaps

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Application session

Continuous period in which an application is both active and visible.

Application session

● — *screen on*

● — *screen off*

Application session

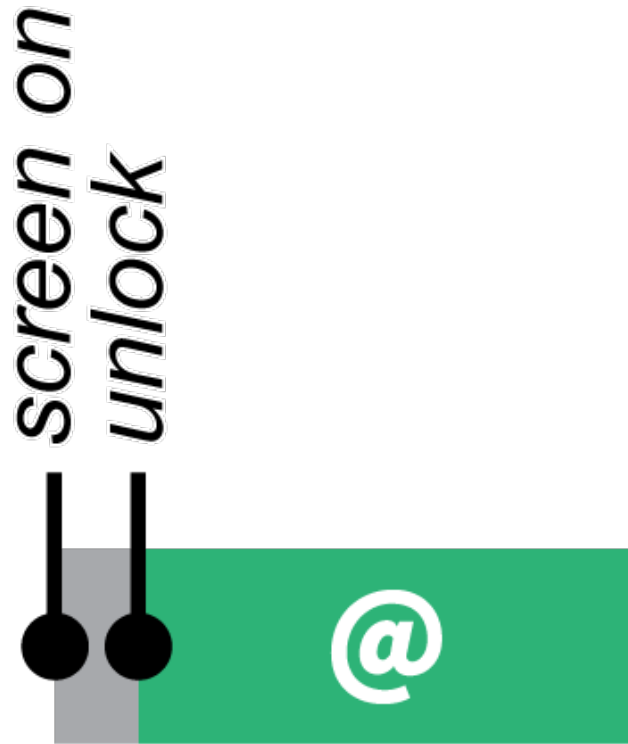
screen on
unlock



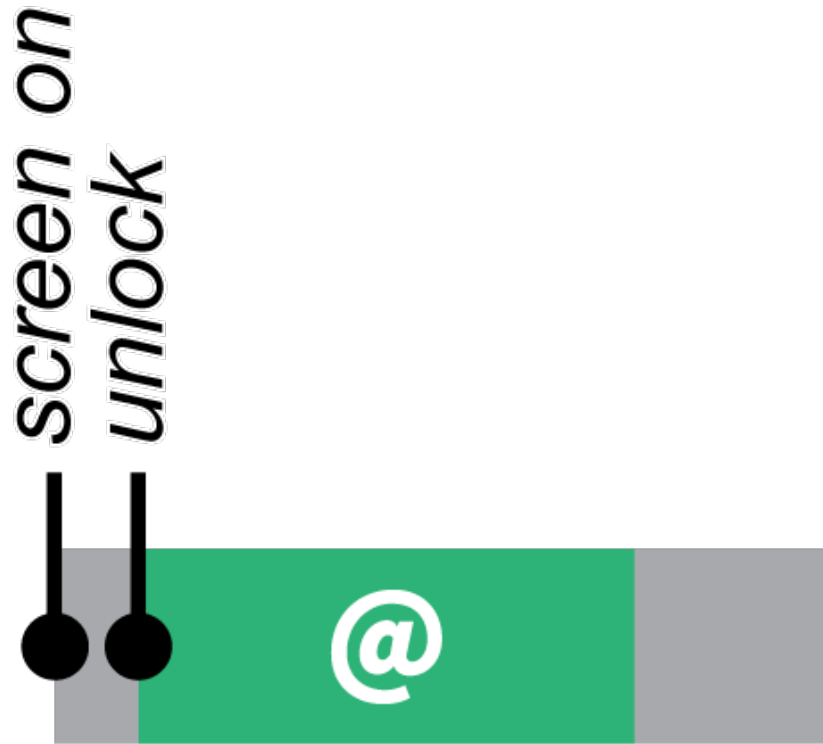
screen off



Application session



Application session



Application session



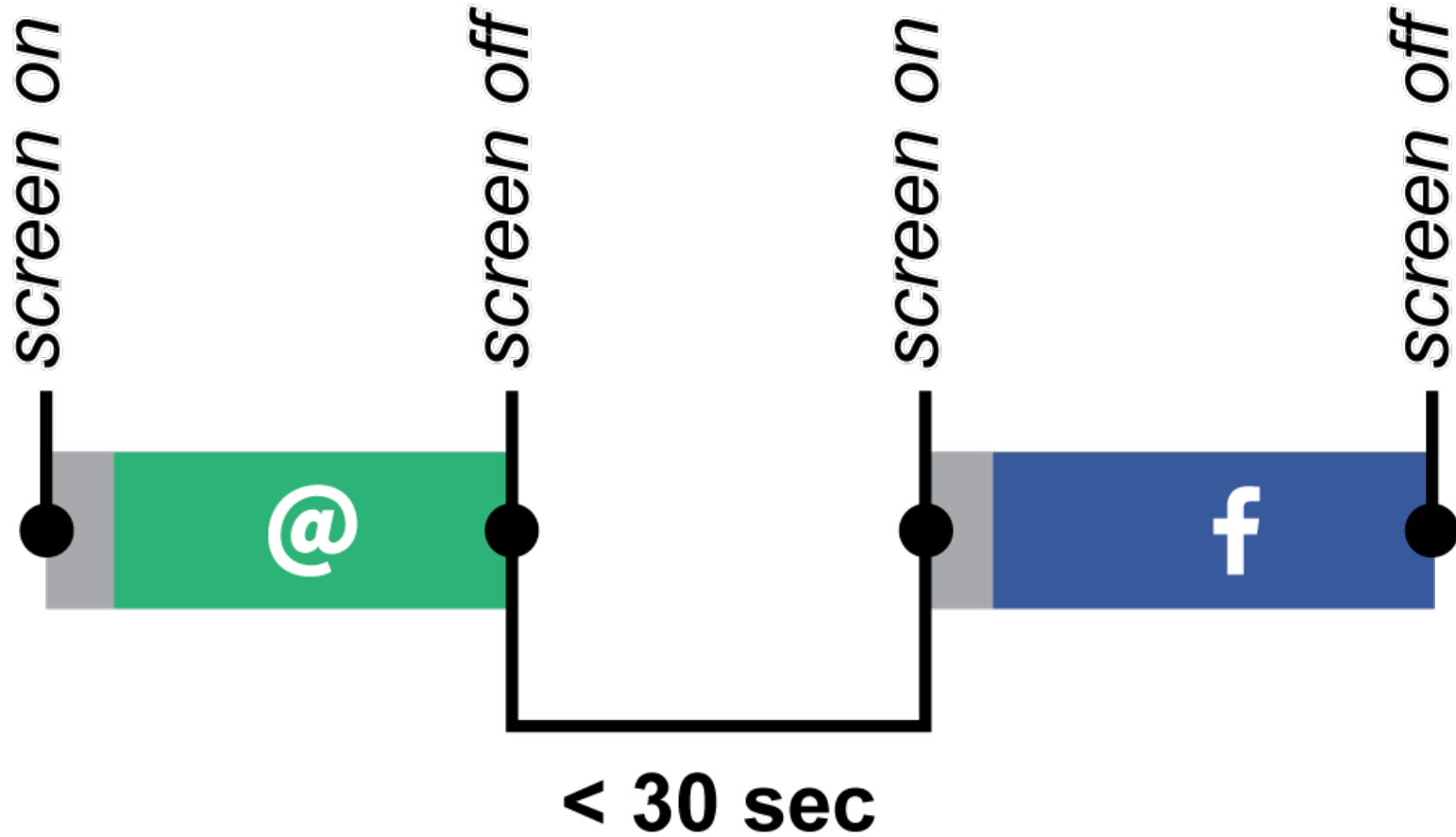


Phone usage session

An interaction sequence without the device going into standby mode for more than 30 seconds.

Carrascal & Church, 2015

Phone usage session

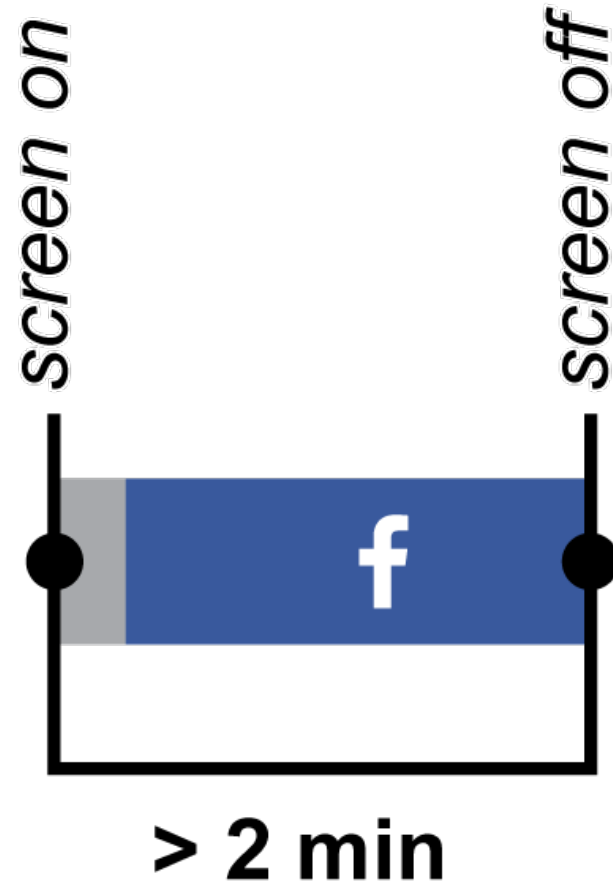
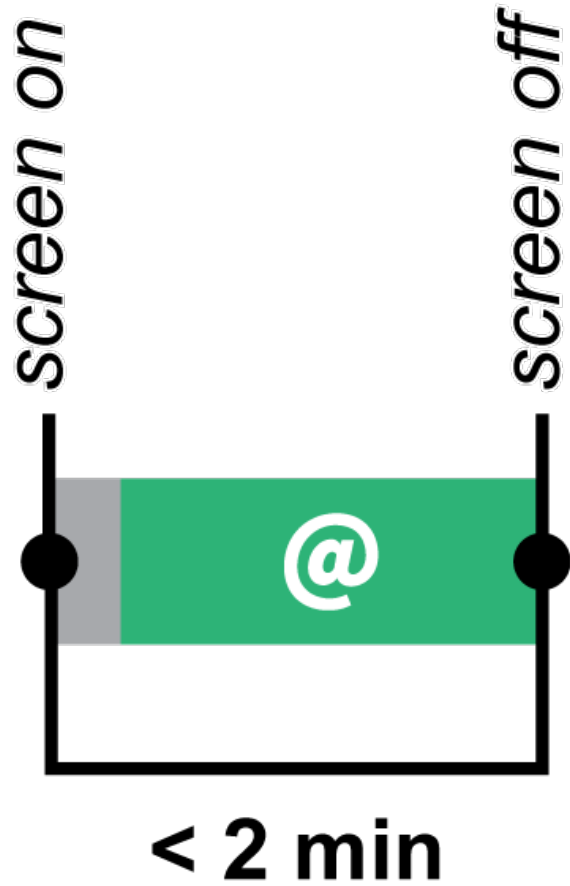


Phone usage session

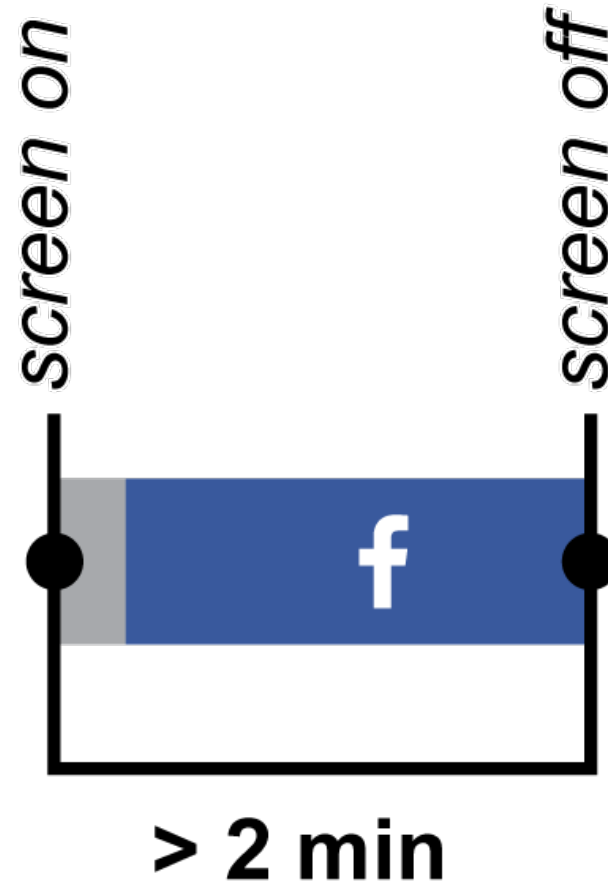
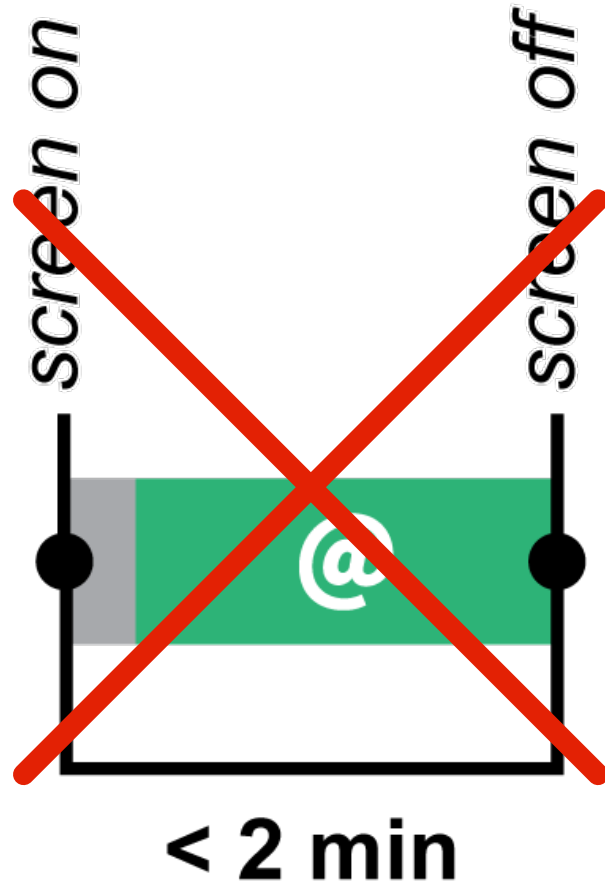
A series of consecutive screen-on time (two minutes or more).

Rahmati & Zhong, 2010

Phone usage session



Phone usage session

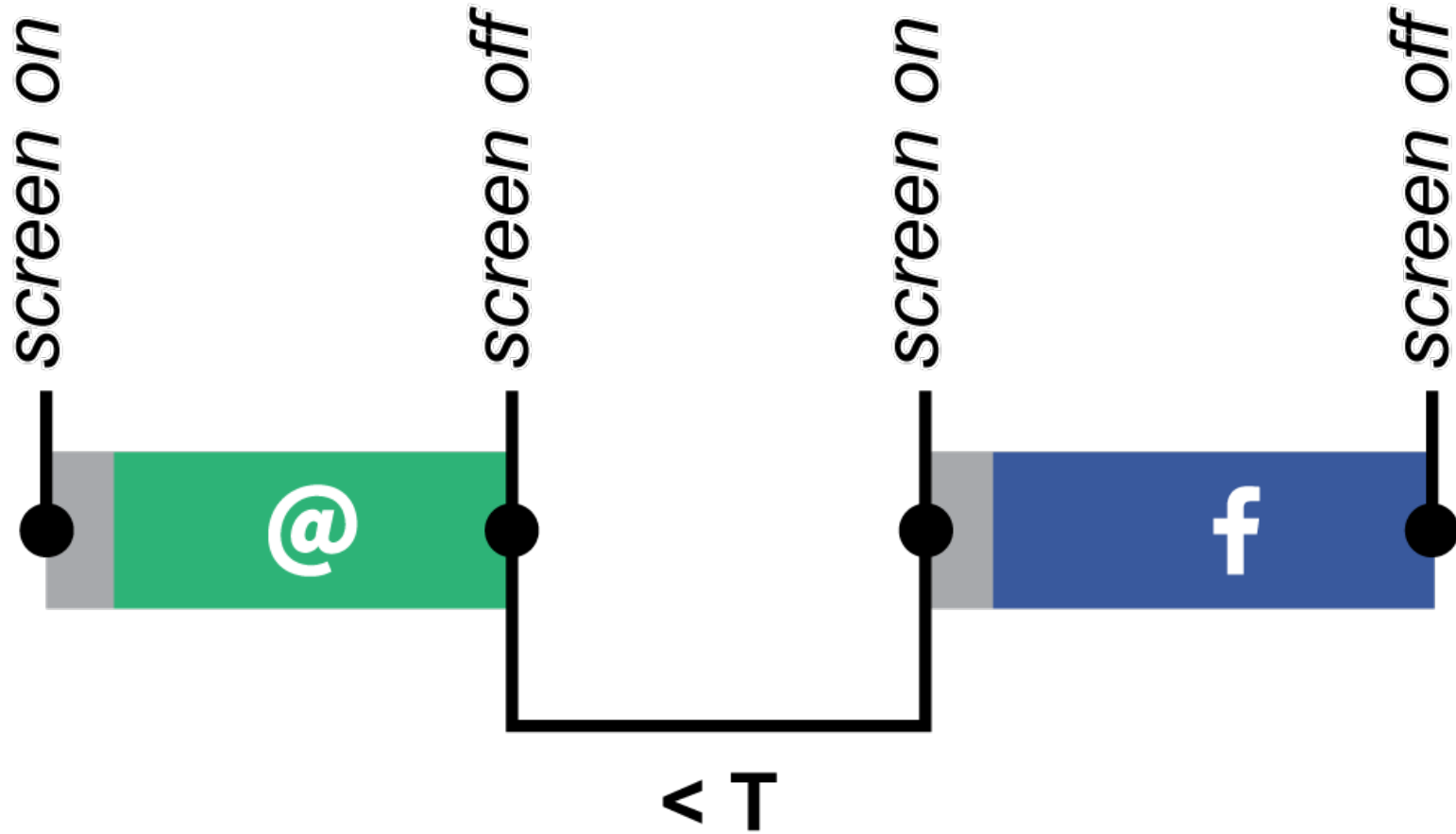


Phone usage session

Combination of one or more application usage sessions with idle time interval less than threshold T (using $T = 0$ and $T = 30$).

Soikkeli et al., 2015

Phone usage session



Phone usage session

An interaction sequence without the device going into standby mode for more than 30 seconds.

Carrascal & Church, 2015

A series of consecutive screen-on time (two minutes or more).

Rahmati & Zhong, 2010

Combination of one or more application usage sessions with idle time interval less than threshold T (using $T = 0$ and $T = 30$).

Soikkeli et al., 2015



Study

Experience Sampling Method

17 participants

7 days

Personal smartphone



Why did you start using your phone?

Please choose below.

**CONTINUE
PREVIOUS
OBJECTIVE**

**START ON A NEW
OBJECTIVE**

User training

20 – 30 minutes

Several scenarios

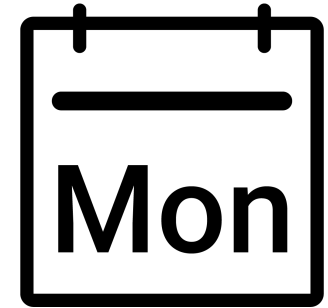
Multiple applications can cover one objective



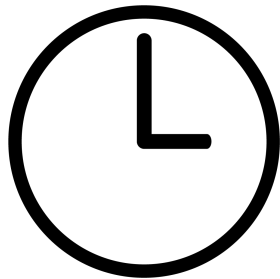
Application
pattern



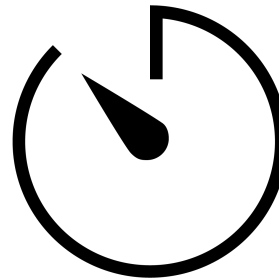
Categories
pattern



Weekday




Hour of
the day



Time gap
between sessions



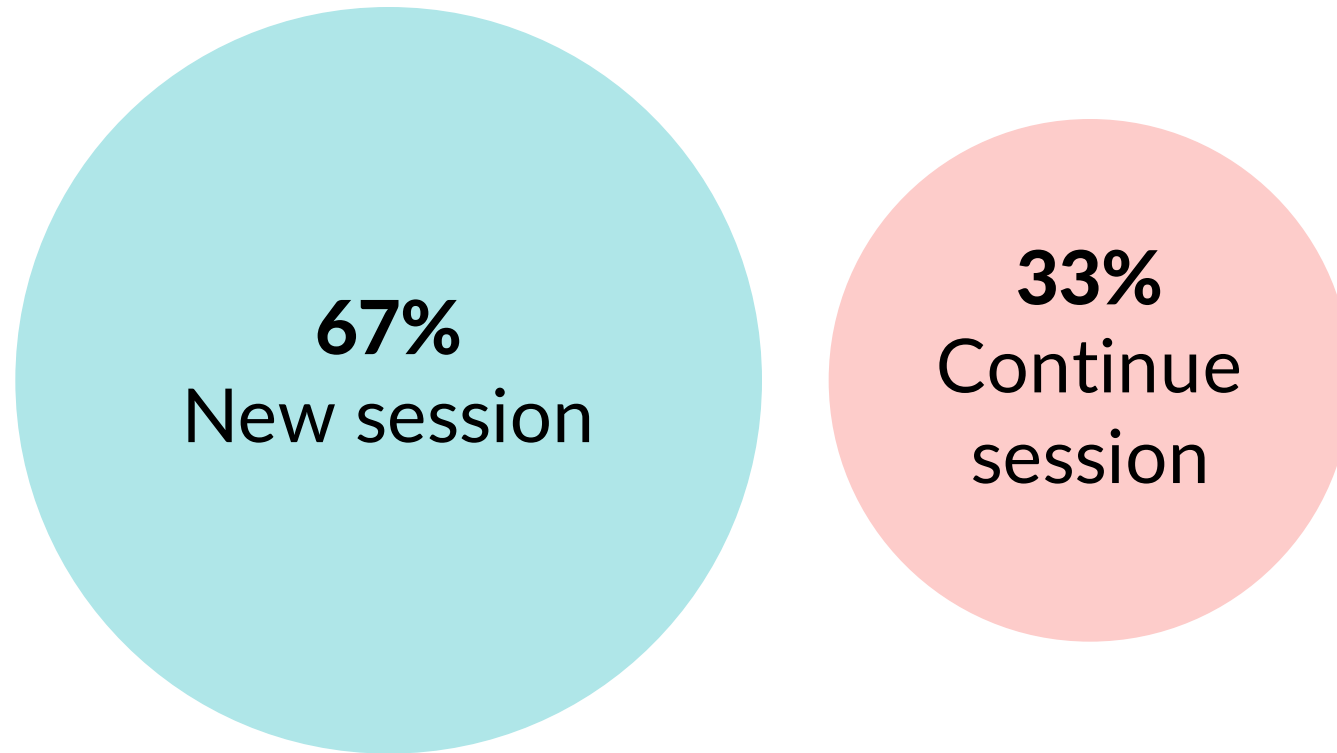
ESM
response



5397
ESMs
send

4569
ESMs
answered

4569 ESMs answered



Classifier I – Constant Classifier

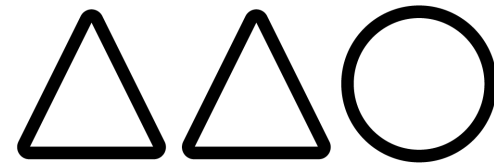
Use of a constant threshold T – as currently used in the literature.

Continue session $< T <$ New session

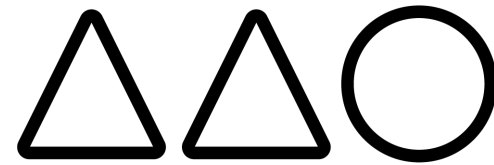
Classifier II - Similar Sets



Classifier II - Similar Sets

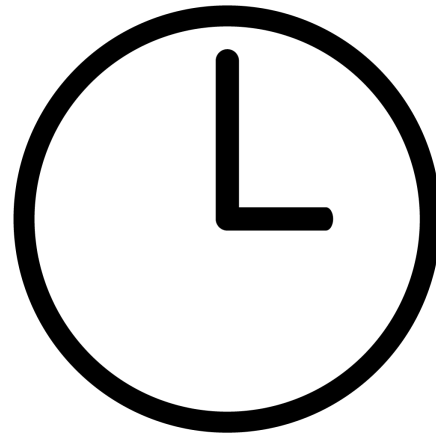


Classifier II - Similar Sets



Classifier III – One Rule

Minimum error attribute



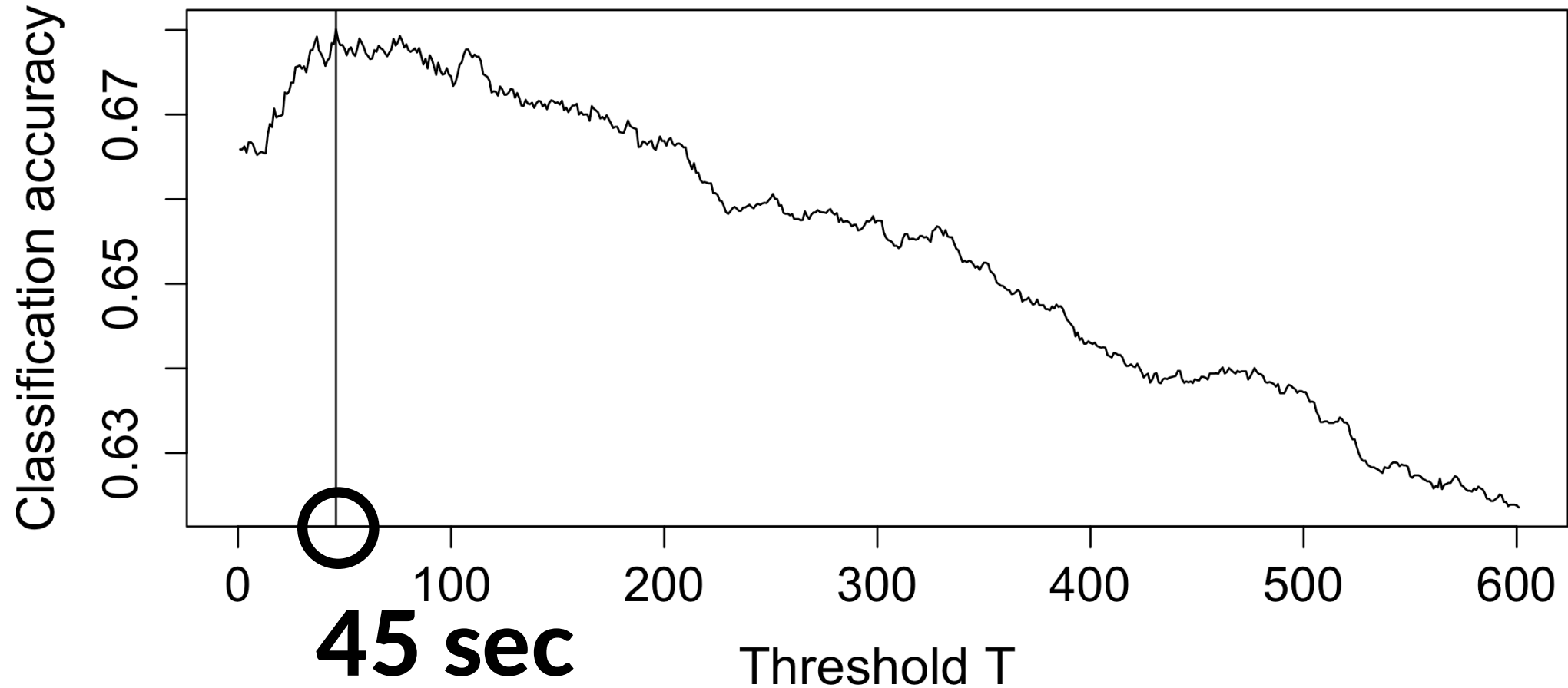
Hour of the day of session

Classifier results

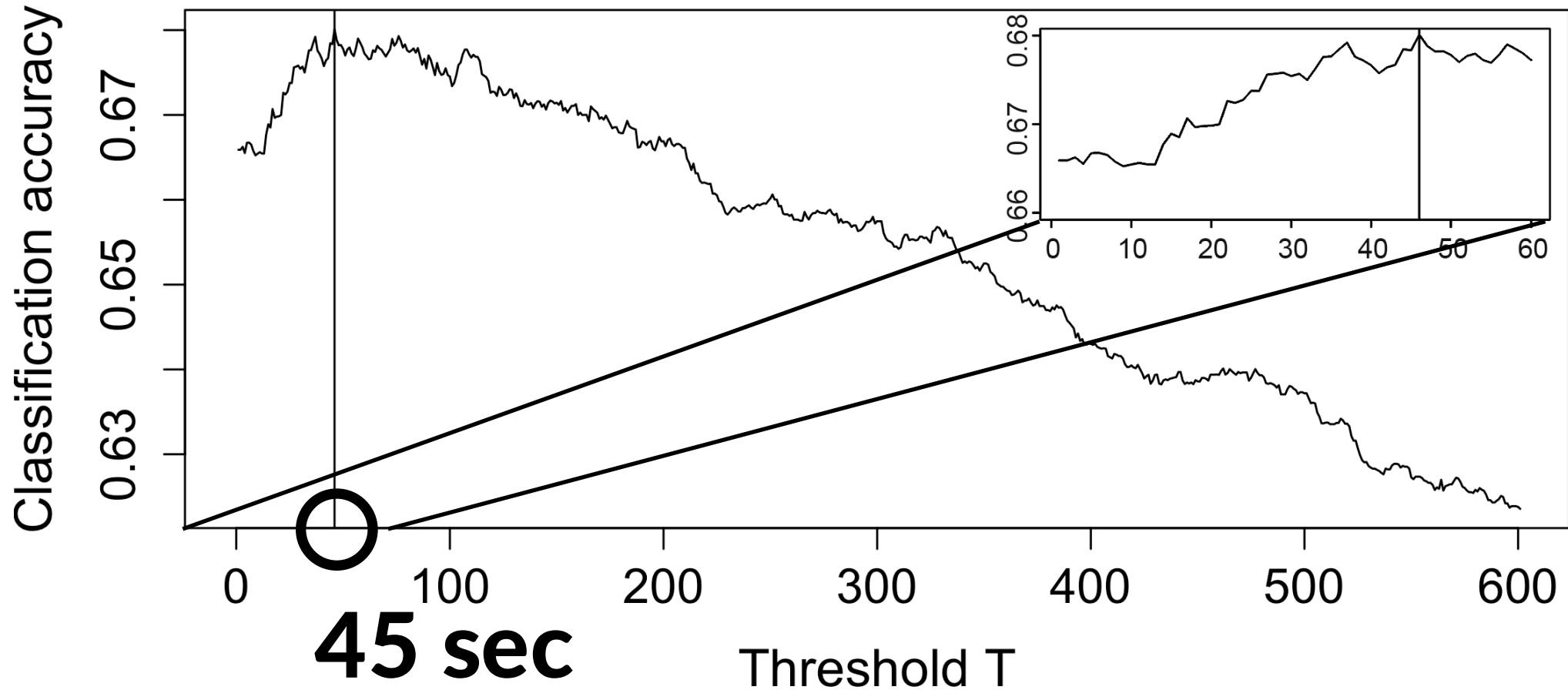
Classifier	Accuracy
I - Constant (45s)	68.0%
II - Similar Sets	64.2%
III - One Rule	62.1%

(10-fold cross validation)

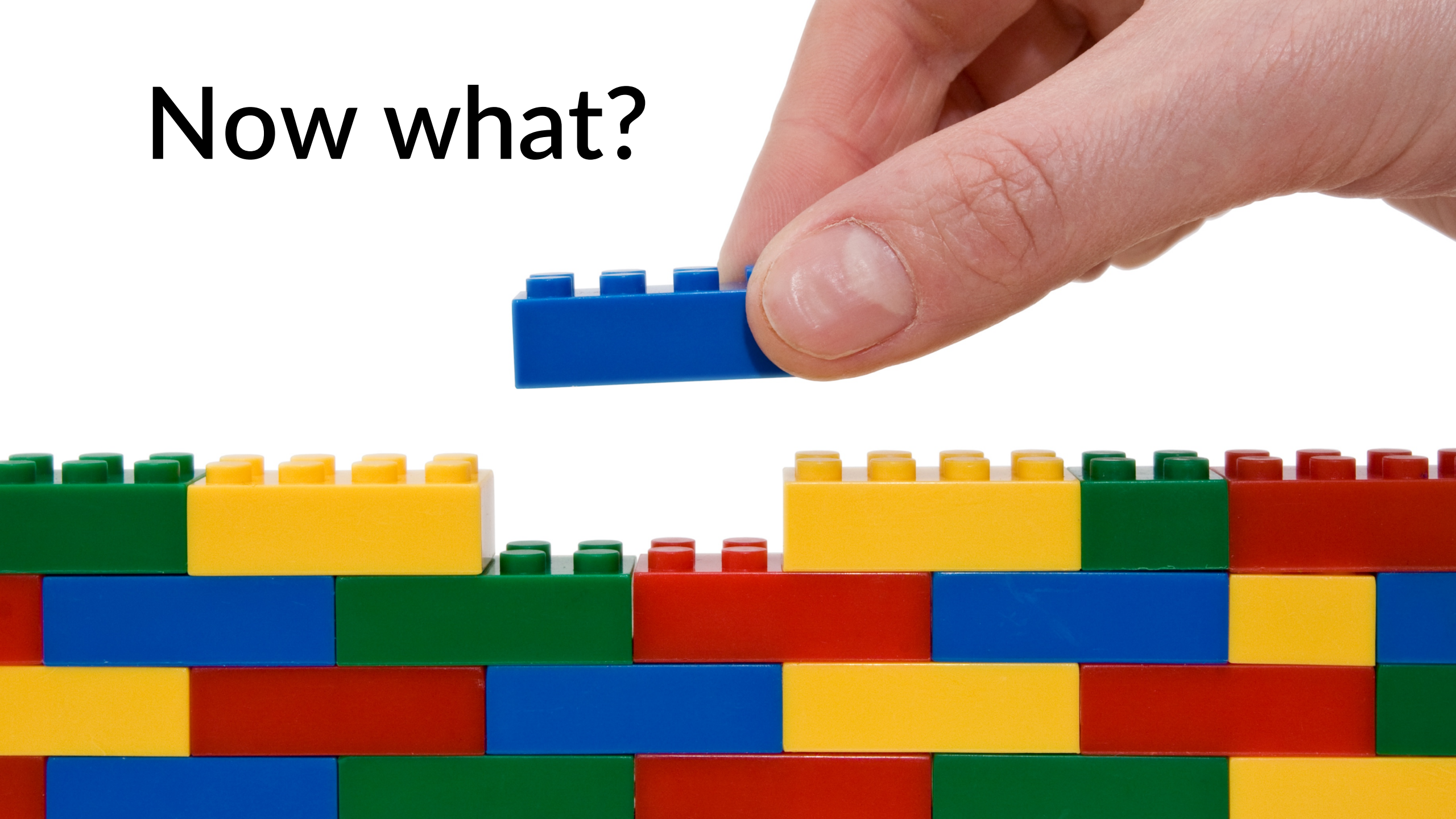
Classifier I – Constant Classifier



Classifier I – Constant Classifier



Now what?



Takeaway

Standby time of <30 sec. lead to new session in 50.8% of cases

Constant time classification not ideal

Threshold value of 45 sec. best results (68% acc.)

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