

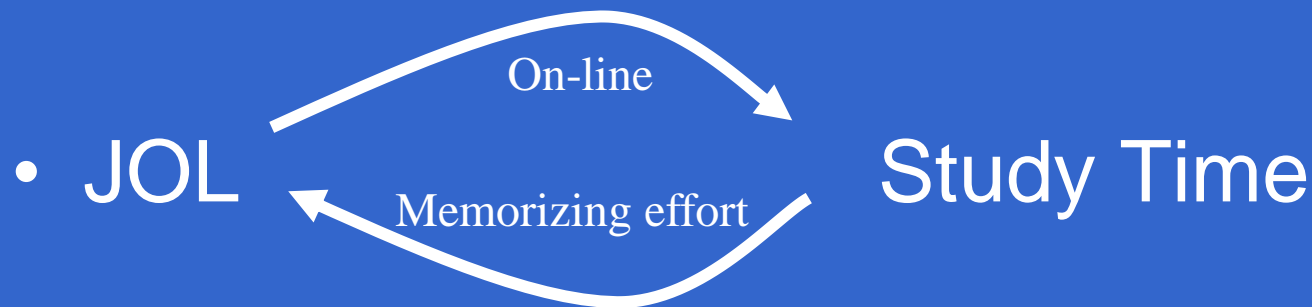
## Processes underlying the allocation of self-paced study

- The Question:  
When do people stop studying?
- Everyday situation.
- Lack of coherent theory.
- Metacognitive processes interaction - monitoring & control in self-paced study.
- Judgments of Learning (JOLs).



# Theoretical background

- People allocate more study time to difficult items and yet supply lower JOLs to those items
- **Norm of study model** (Le-Ny, Denheire & Tallinter, 1972; Nelson & Narens, 1990; Theide & Dunlosky, 1999 )



(Koriat, Ma'ayan & Levy-Sadot, in preparation).

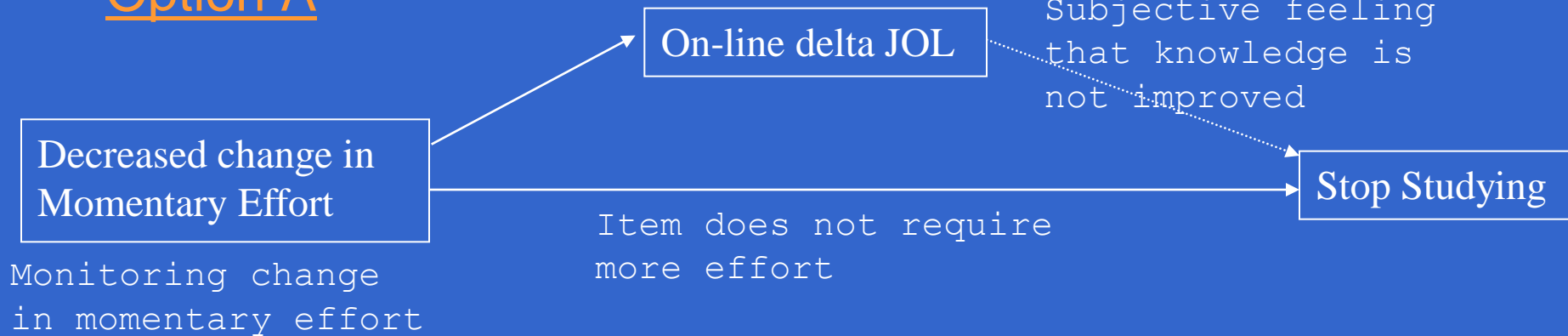
# Towards a new model

- Capacity model - Kahneman (1973)
  - Internal Feedback
  - Momentary effort
  - Limited voluntary control
- Self-regulation by monitor of change (Carver & Scheier, 1990).



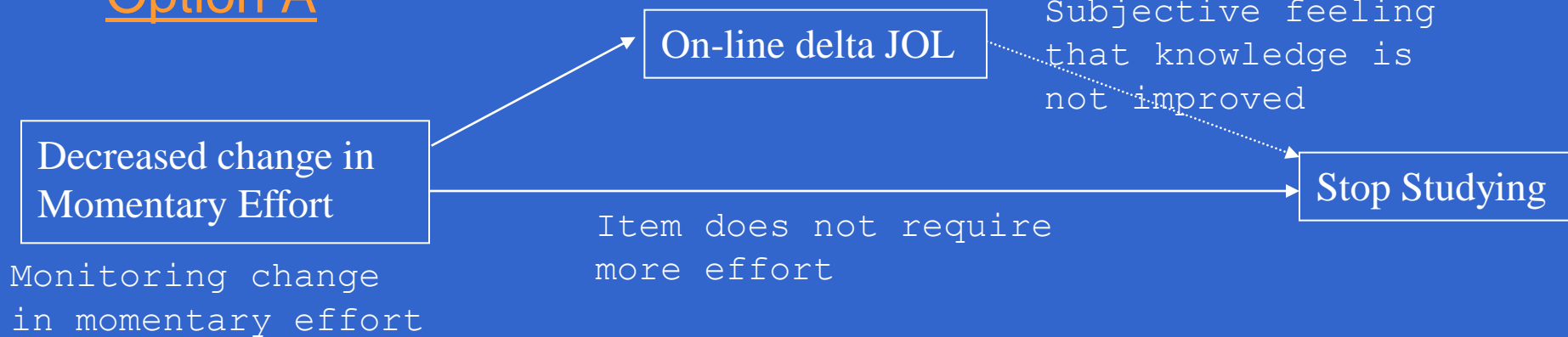
# Self-Paced learning by change monitoring (1)

## Option A



# Self-Paced learning by change monitoring (2)

## Option A



## Option B





# Use of Pupillary

- Pupil diameter is a *reliable measure of mental effort* invested in a task (Hess & Polt, 1964; Kahneman & Beatty, 1966; Janisse, 1977; Beatty, 1982).
- Changes in pupil diameter during mental task represent *second-by-second variations* in mental effort. Both within and between tasks.
- Recent studies (Just & Carpenter, 1993) suggested to use pupil diameter as a dependent variable in order to check whether *its change can predict behavior* and not only represent it.

# Experimental section

Assumption: Changes in pupil diameter reflect second-by-second variations of effort invested in the learning task.

Goal: To investigate the connection between the change in momentary effort and the timing of study termination.

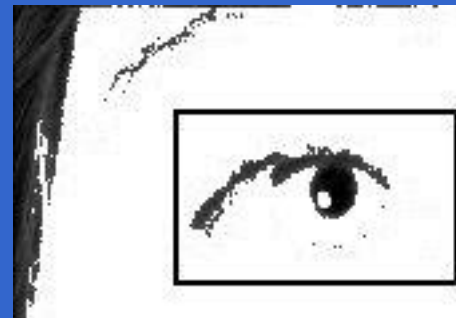
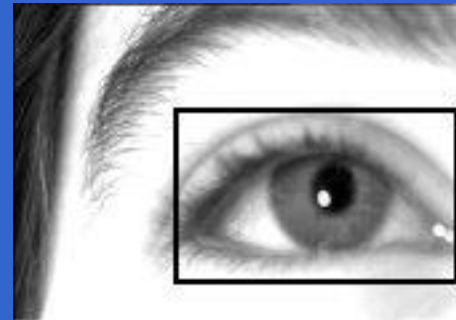
Procedure:

Learning stage - *eye photo*

*item-by-item, self-paced, end-of-study JOL*

Test stage -

*recall*

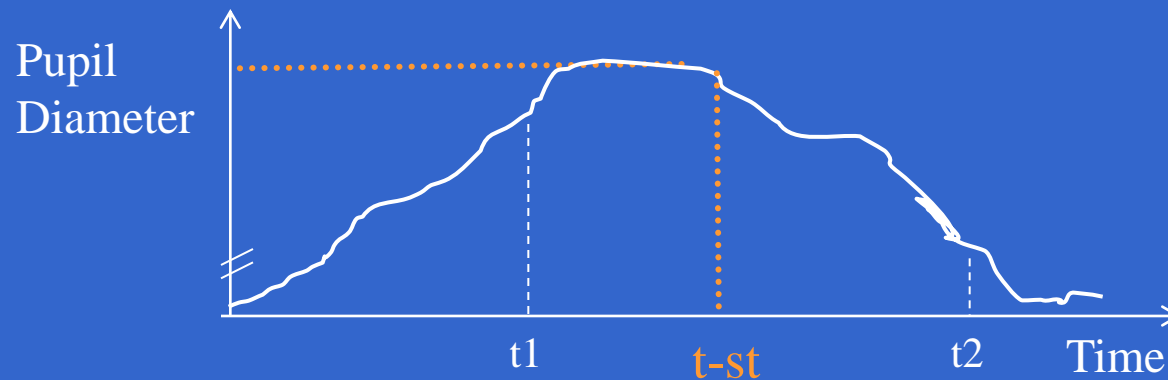


# Instrumentation setup





# Pupil diameter by time - predicted curve

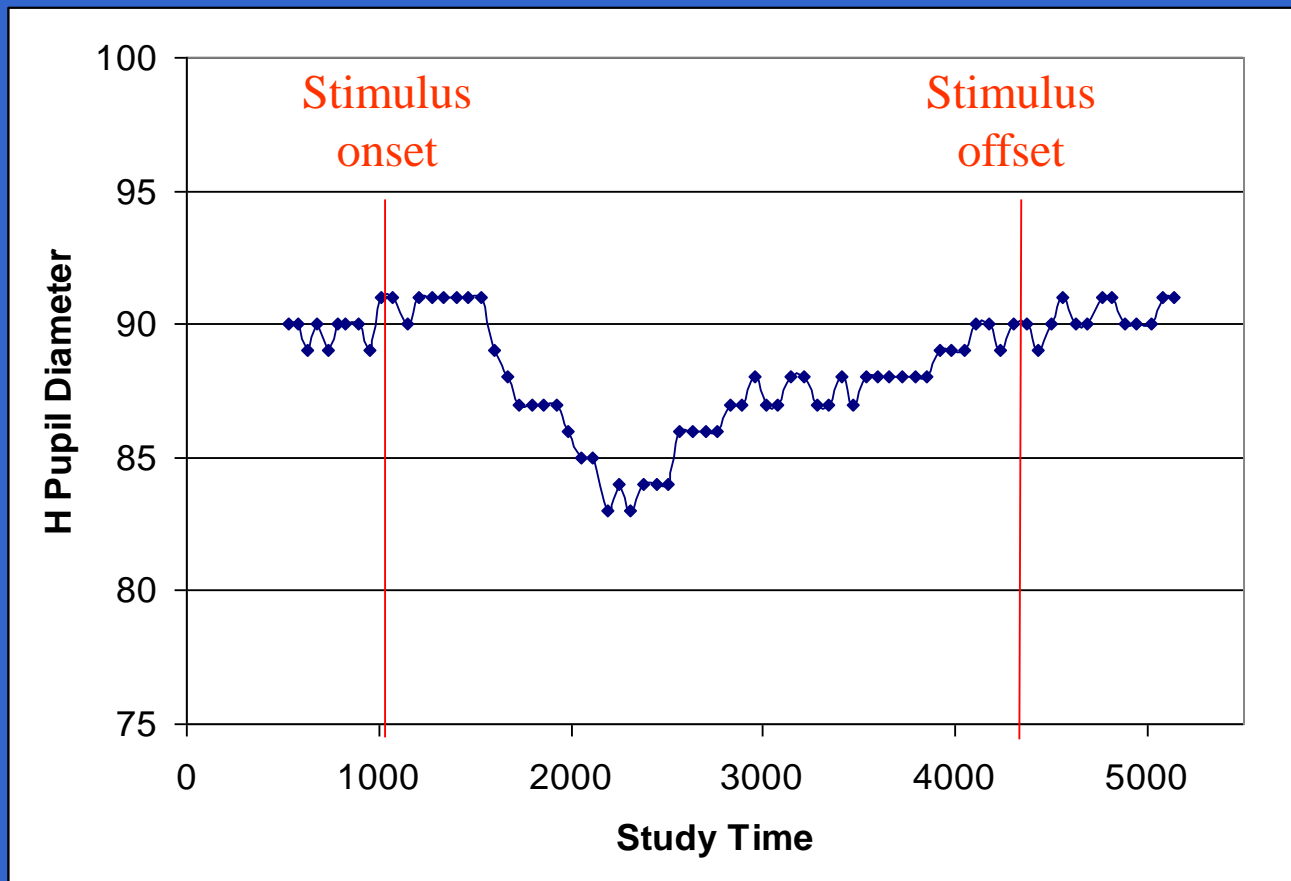


$t-st$  is predicted timing of self-termination of study

Based on a typical function of pupil diameter change during cognitive tasks

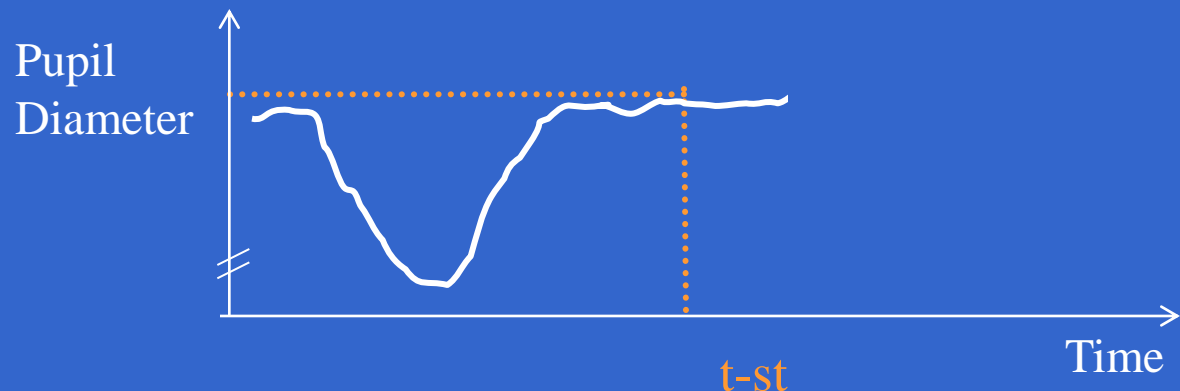
# First results (example)

Item to be learned: Clean - Order



# Primary Discussion

Complicated ! Disappointing? Unclear...



Measures: pupil latency, the zone below the curve,  
end-of-study JOL

Analysis: correlations, regressions.

# My little Zohar



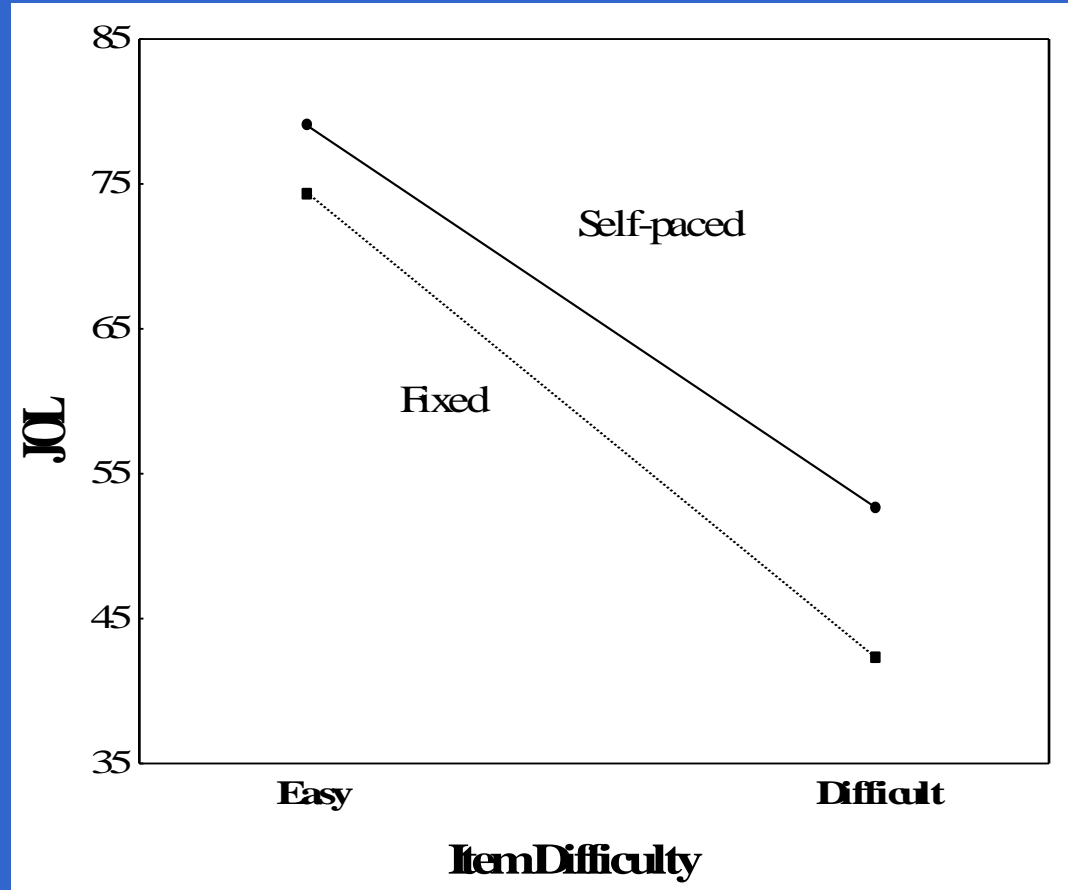
## Khaneman, 1973

- "Momentary capacity, attention, or effort is controlled by feedback from the execution of ongoing activities..." [p. 13 ]
- "Arousal and effort are usually not determined prior to the action: they vary constantly, depending on the load which is imposed by what one does at any instant of time" [p.14]
- "... the effort invested in a task is mainly determined by the intrinsic demands of the task, and that voluntary control over effort is quite limited..." [p. 15]

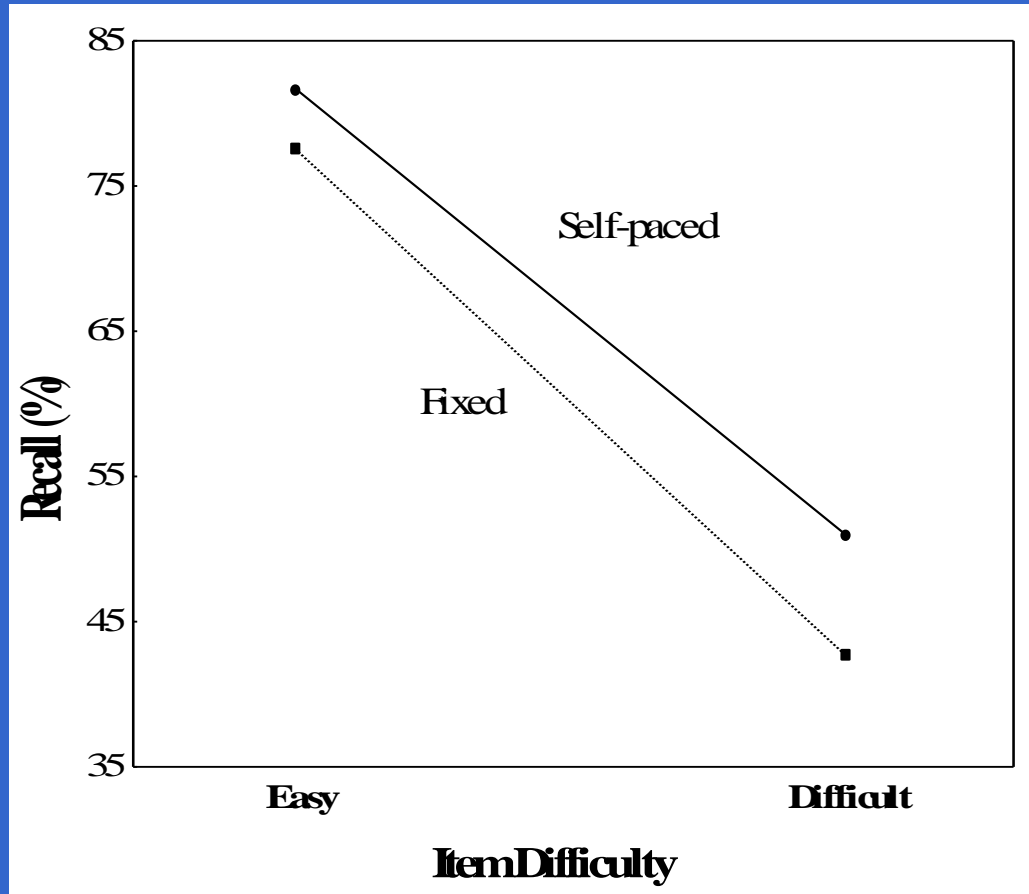
# Study Time - Difficulty



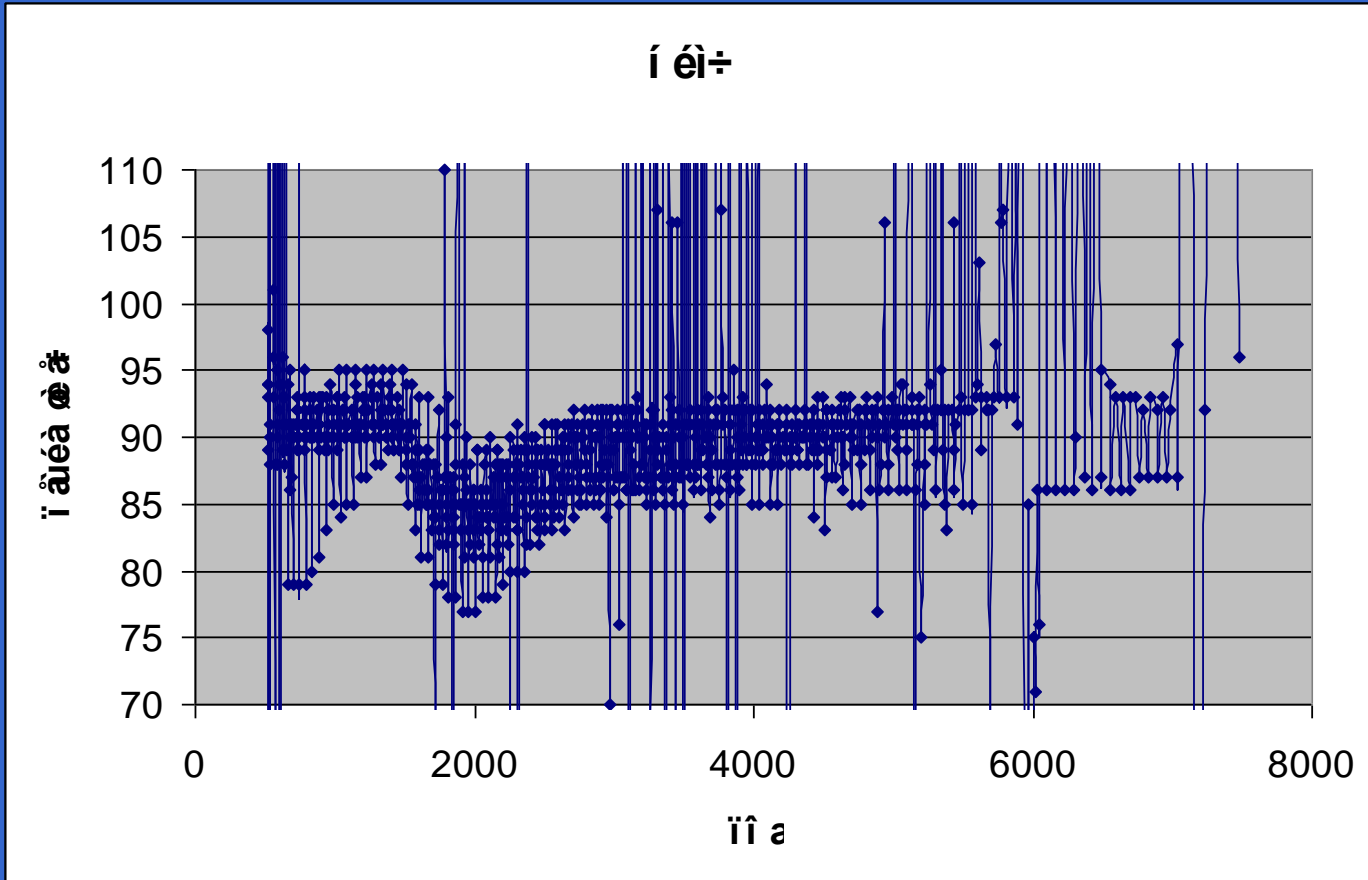
# JOLs - Difficulty

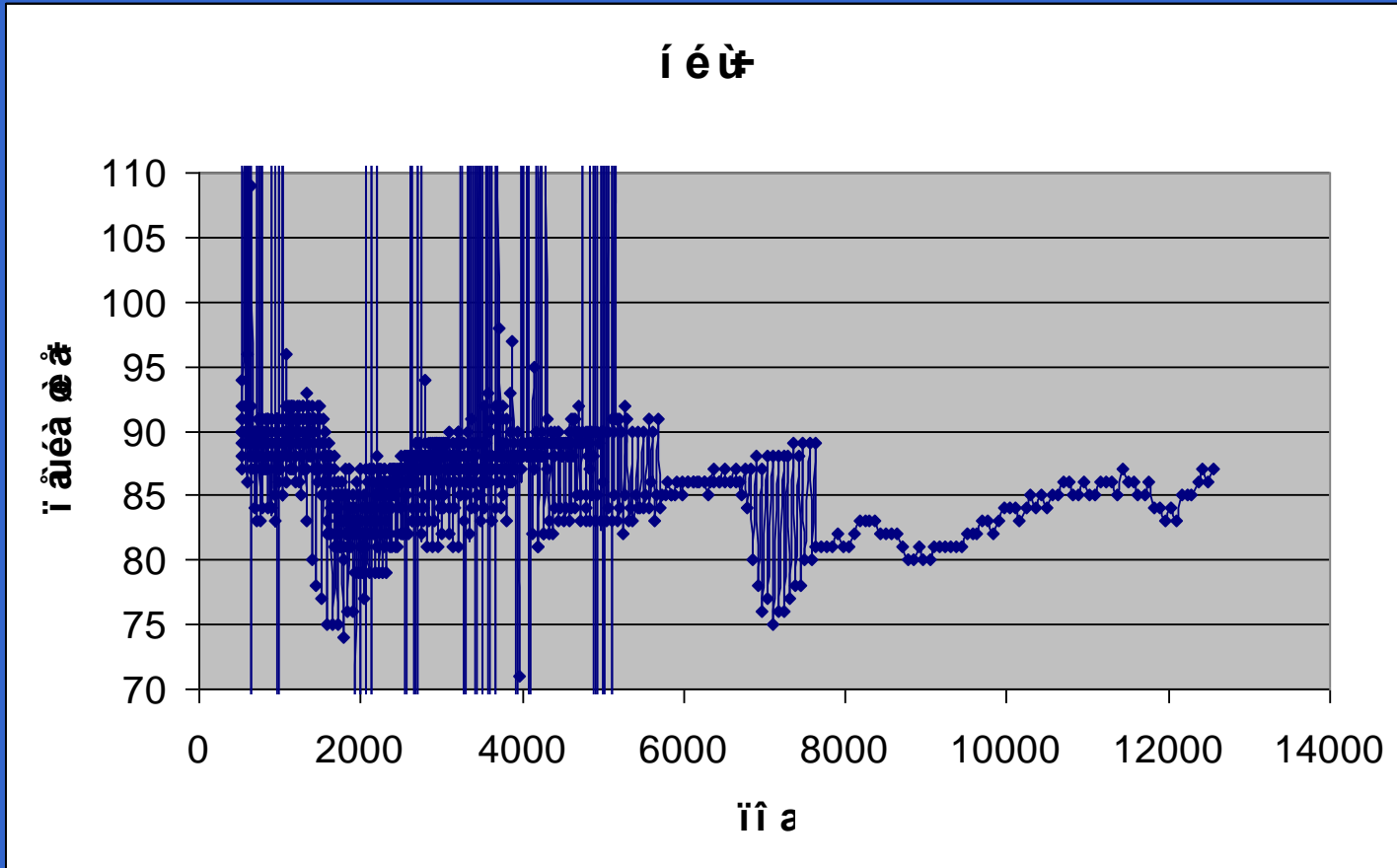


# Recall - Difficulty





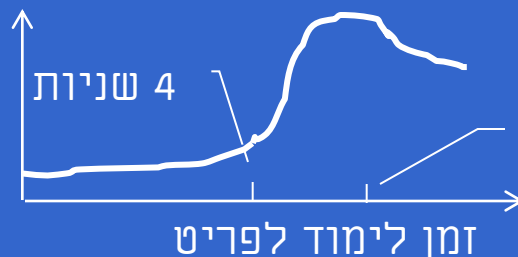






# ניסוי 1 - מדד תועלת סובייקטיבית מתוספת זמן לימוד (למול JOL) - המשך

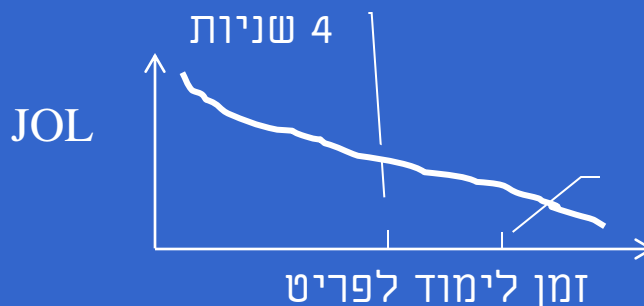
תועלת סובייקטיבית  
של תוספת זמן לימוד



(ממוצע - לפי נבדקי הויסות העצמי)

מדד תועלת

JOL



(ממוצע - לפי נבדקי הויסות העצמי)

(4 + התוספת במדד)

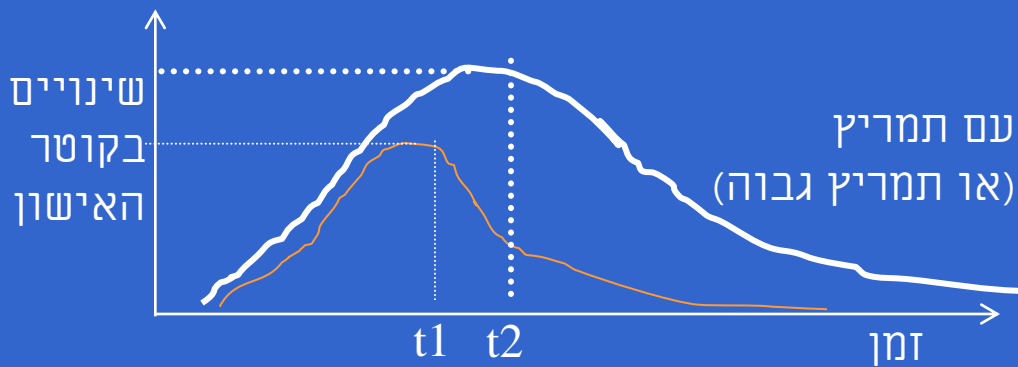
הנתונים הצפויים לגבי נבדקי הויסות הקבוע  
בהינתן ש-4 שניות הן ממוצע זמן הלימוד לפריט



## ניסוי 3 - מאמץ מושקע (ע"י הלומד) ומאמץ נדרש (ע"י הפריט)

- מטרה: לחדד את ההבנה לגבי אופן השקלול של מאמץ למידה מושקע ונדרש במהלך ובתום הלמידה
  - מוטיבציה משפיעה על המאמץ המושקע בלמידה
  - קושי הפריט משפיע על המאמץ הנדרש מן הלמידה (מאמץ נורמטיבי)
- כיצד משפיעה המוטיבציה על מאמץ הלמידה?
  - אלטרנטיבה א' - ניתן להשקיע יותר מאמץ
  - אלטרנטיבה ב' - ניתן להישאר זמן רב יותר ברמת מאמץ מסוימת
  - בנסיבות שונות (למשל פריטים קשים לעומת קלים), נטייה לאלטרנטיבה א' או ב'

# ניסוי 3 - מאמץ מושקע (ע"י הלומד) ומאמץ נדרש (ע"י הפריט) - המשך א'



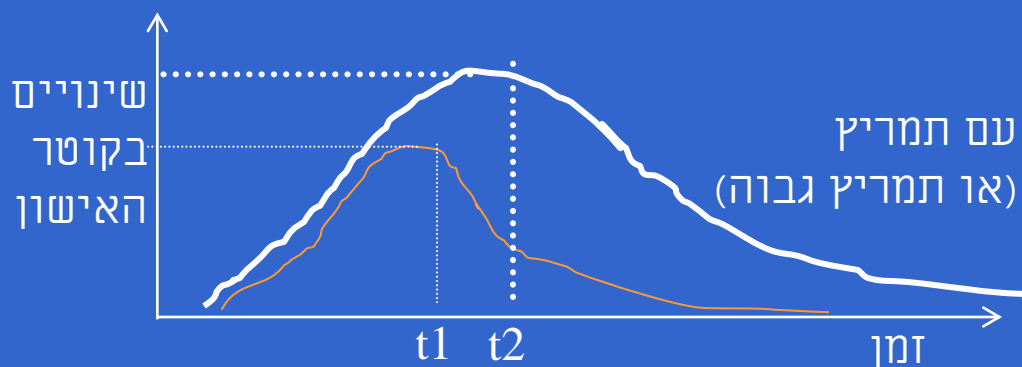
גישה א'

ללא תמריץ  
(או תמריץ נמוך)

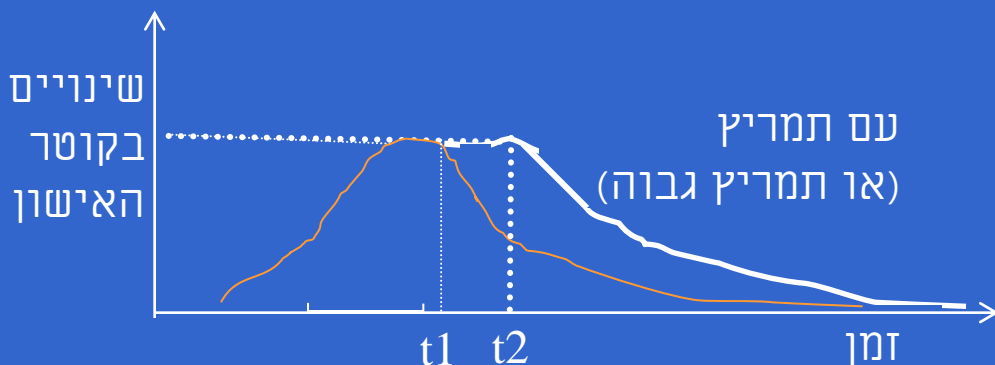


# ניסוי 3 - מאמץ מושקע (ע"י הלומד) ומאמץ נדרש (ע"י הפריט) - המשך ב'

## גישה א'



## גישה ב'



ללא תמריץ  
(או תמריץ נמוך)

