Reading User Intentions through Natural Behavior

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Intelligent User Interfaces Laboratory

- **Dr. T. Metin Sezgin (director)**
- **Personnel**
  - 10 Graduate students
- **Sponsored projects**
  - DARPA
  - Türk Telekom
  - Koç Sistem
  - Research Council of Turkey
  - Ministry of Science Industry & Technology

- **Areas of expertise**
  - Intelligent User Interfaces
  - Sketch-Based Interfaces
  - Sketch recognition
  - Affective computing
    - Emotion recognition
    - Emotion synthesis (animation)
  - Multimodal interfaces
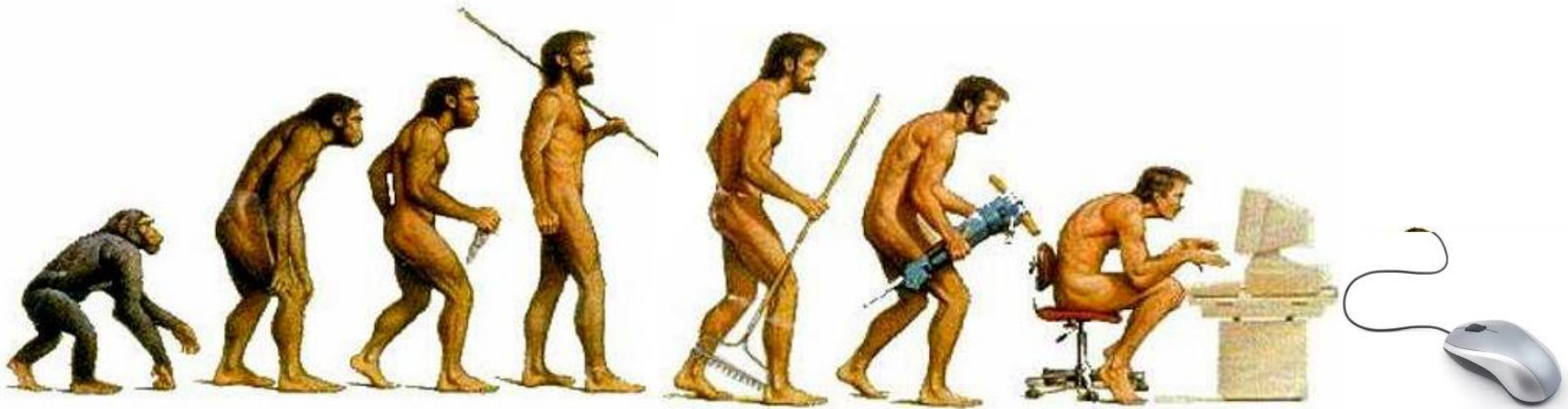   - Speech, sketching, haptics, eye-gaze

The Problem

- **We went wrong in HCI**
    - **Very little progress over the years**
    - **Stuck with old habits**

The Problem

- **We went wrong in HCI**
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- **We went wrong in IUIs**
  - **Sophisticated HW & SW**
  - **Failed to leverage natural human behavior**

We should be alarmed!

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The Problem

- **We went wrong in HCI**
  - **Very little progress over the years**
  - **Stuck with old habits**
- **We went wrong in IUIs**
  - **Sophisticated HW & SW**
  - **Failed to leverage natural human behavior**
- **Suggestion: leverage natural human behavior**
  - **Useful patterns go unnoticed**
  - **Discover previously unknown patterns**
  - **Human-behavior mining**
- **Two case studies**
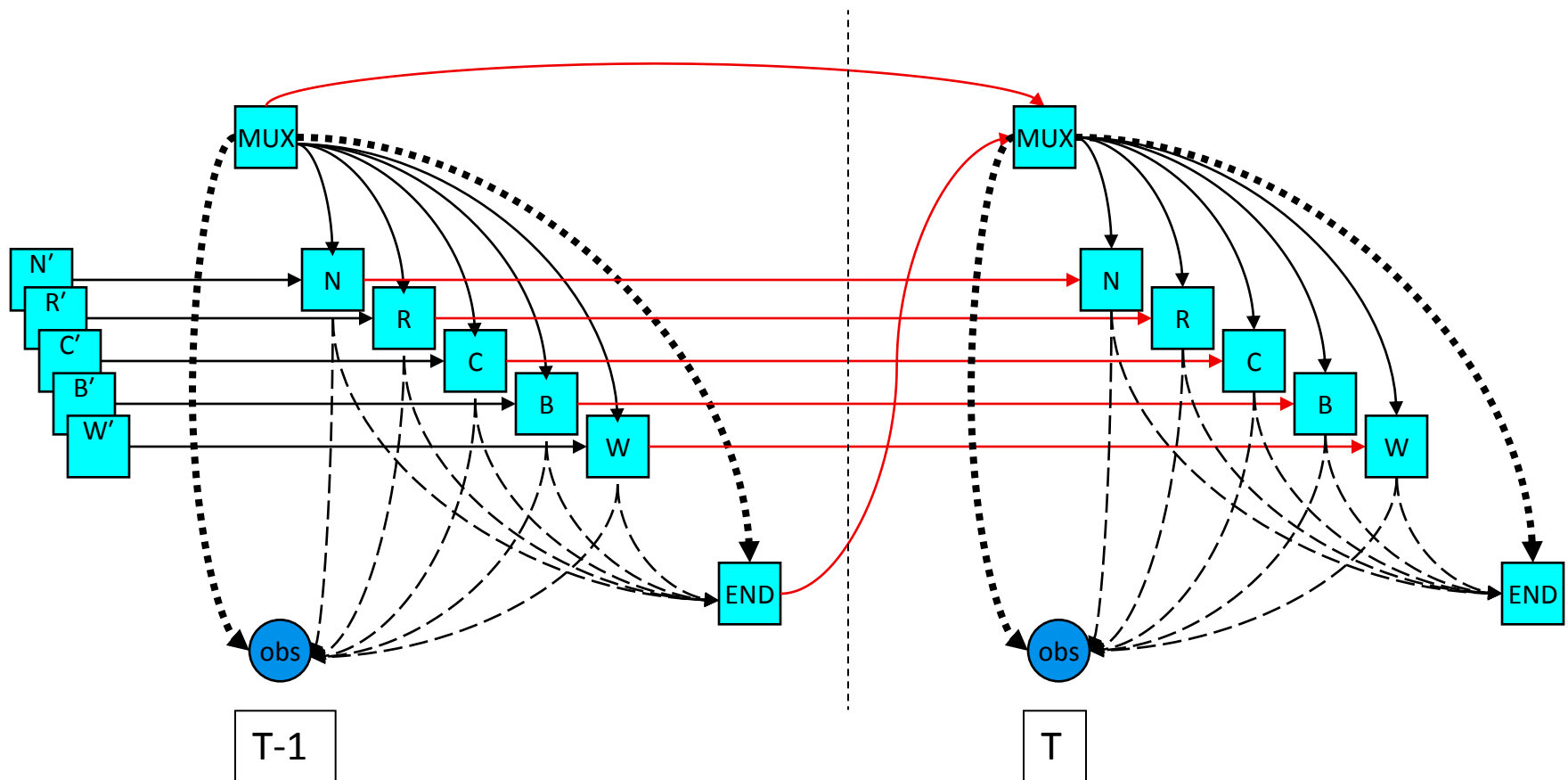 - **Mini experiments**
  - **Human behavior ➔ predict user intention**

Case #1

- **Exercise**
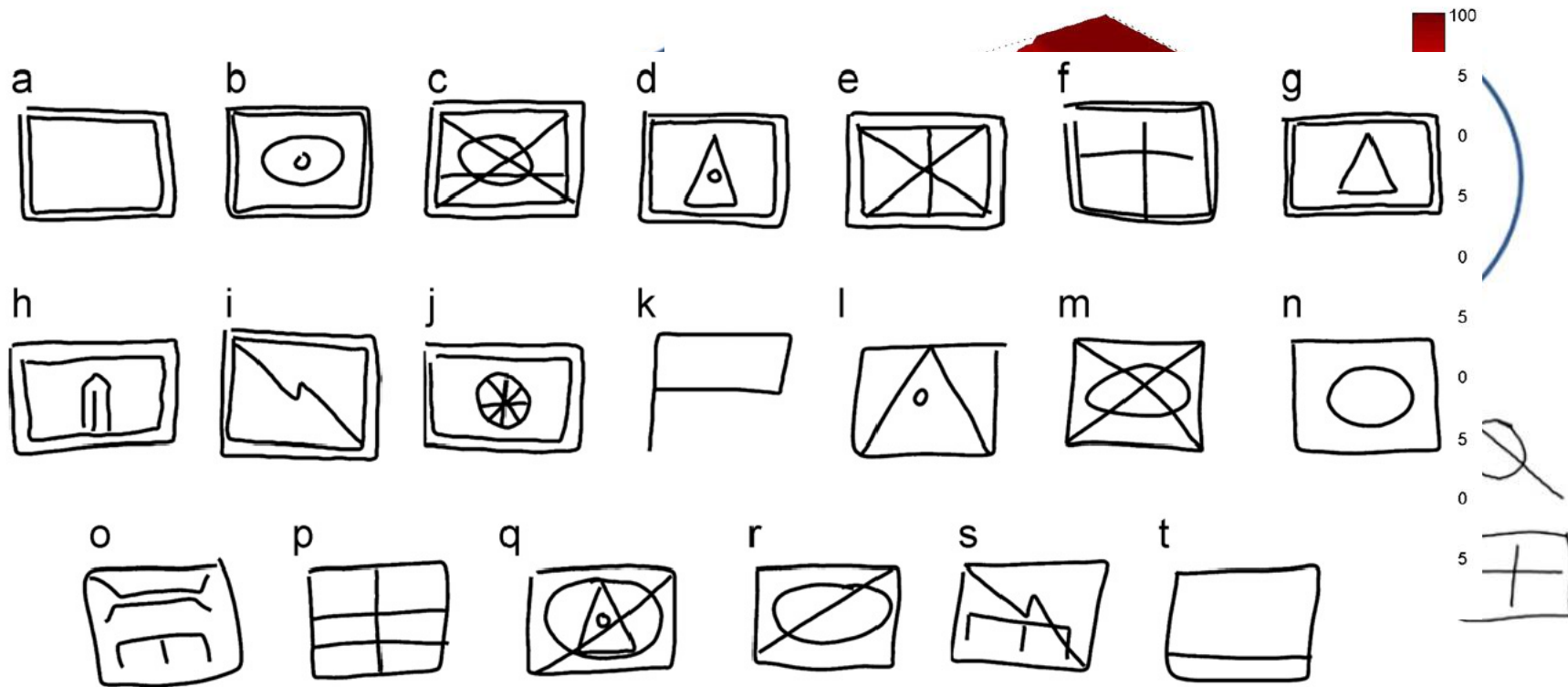 - **Draw objects**
- **Observe human behavior**
- **Practical use**
  - **Sketch recognition**
  - **Auto-completion of drawings**

Sketch Recognition & Auto-completion of drawings

Sketch Recognition & Auto-completion of drawings

T. M. Sezgin and R. Davis, **Sketch Recognition in Interspersed Drawings Using Time-Based Graphical Models.** *Computers & Graphics Journal, Volume 32 , Issue 5, pp: 500-510 (2008).*

Ç. Tırkaz, B. Yanıkoğlu, T. M. Sezgin, **Sketched Symbol Recognition with Auto Completion.** *Pattern Recognition, vol 45, issue 11, pp 3926-3937 (2012).*
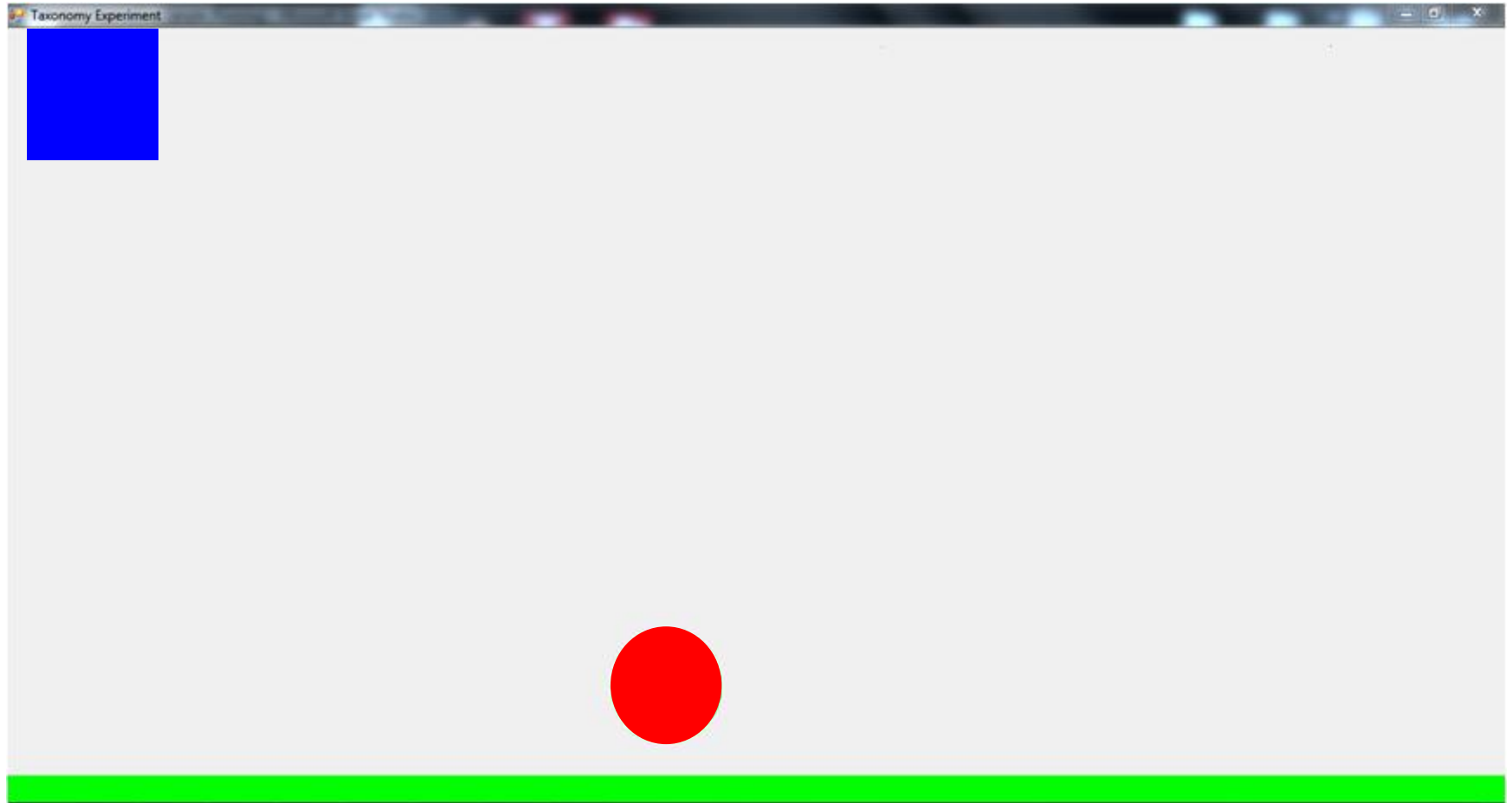
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Case #2

- **Exercise**
  - **Manipulate objects**
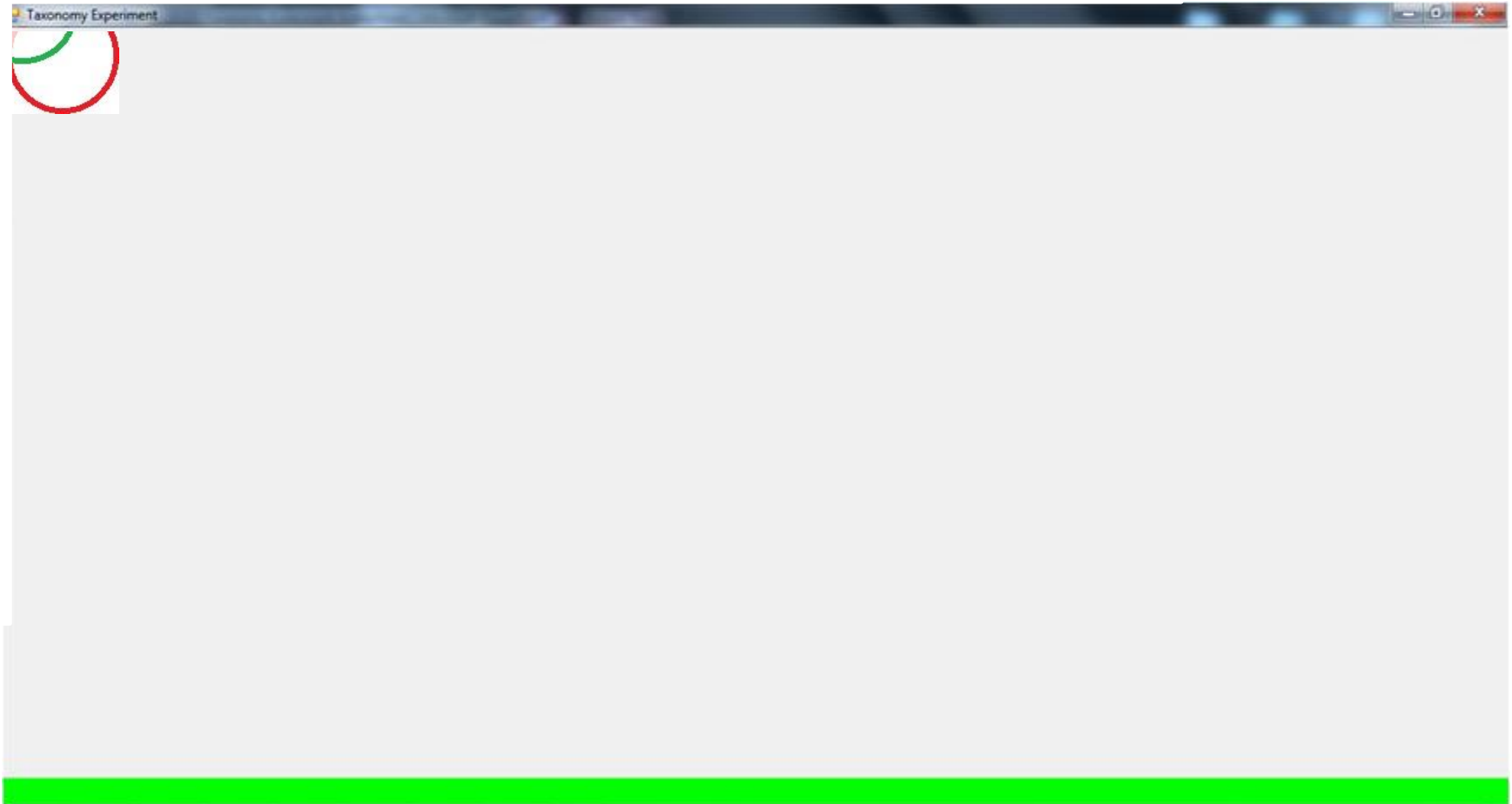
Virtual Interaction Task – Drag

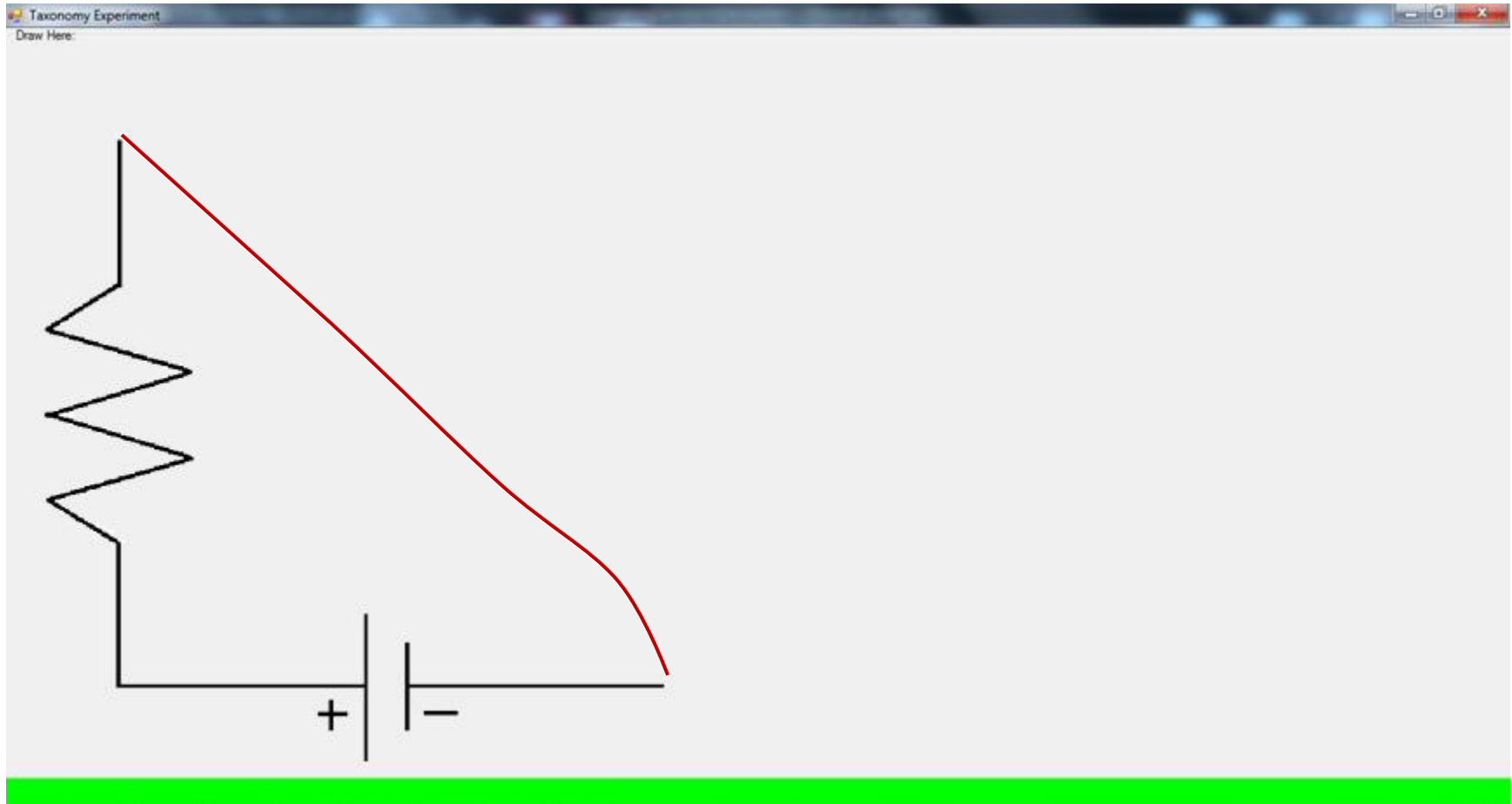# Virtual Interaction Task – Maximize

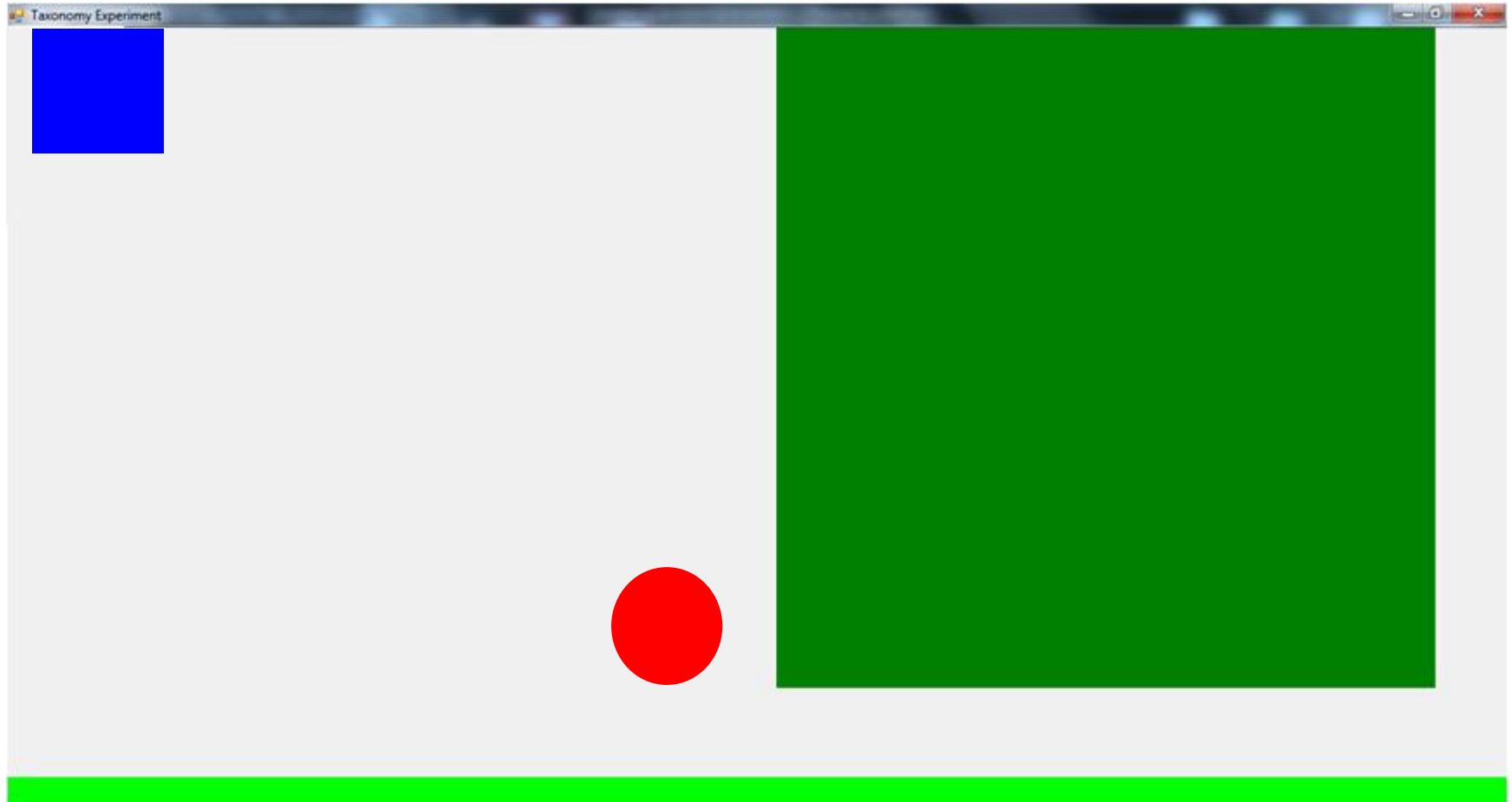# Virtual Interaction Task – Minimize
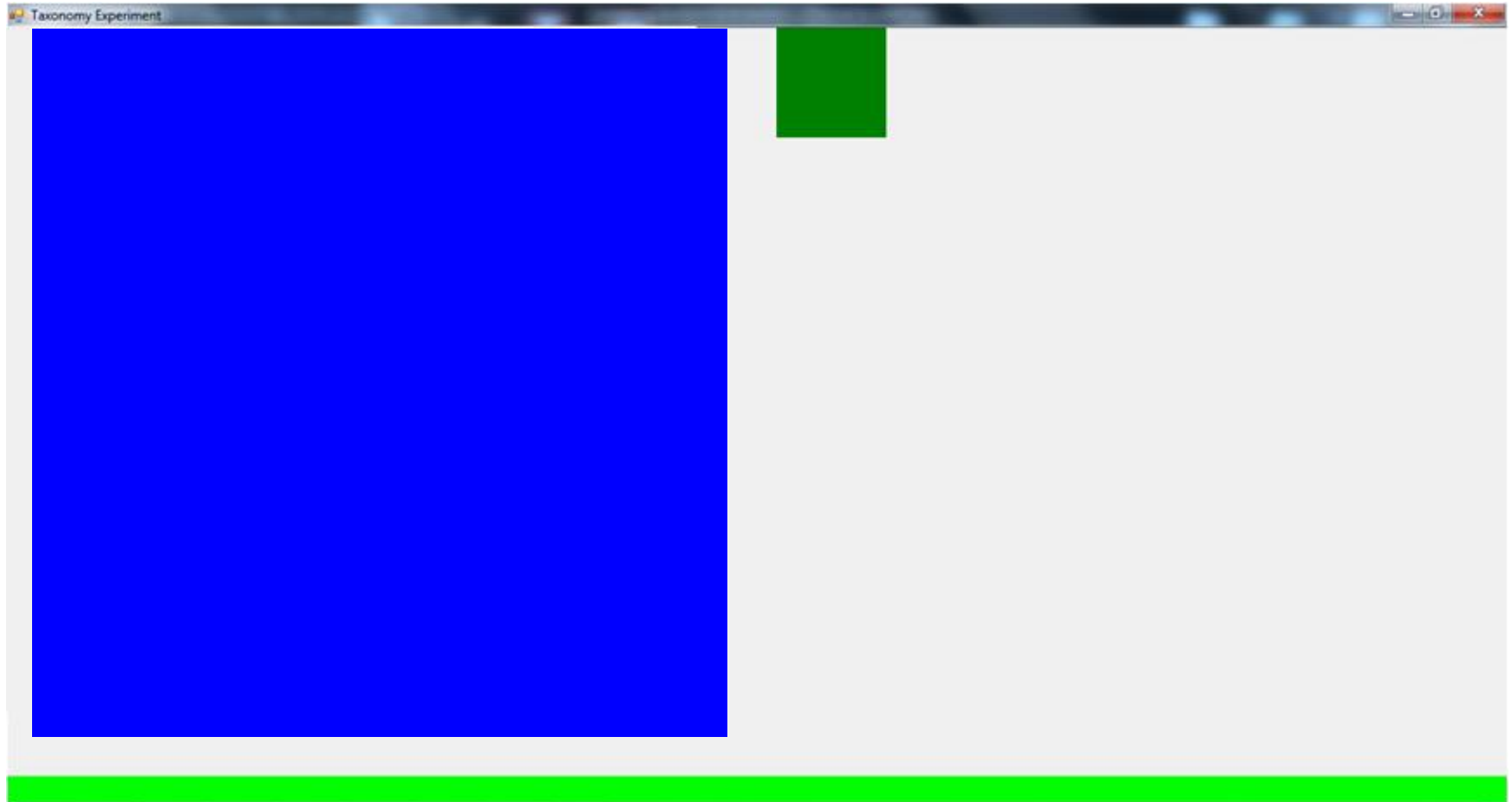
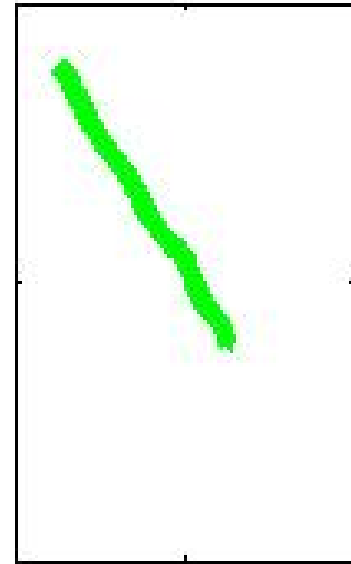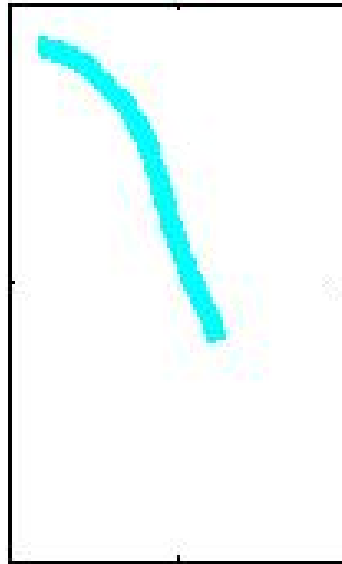# Virtual Interaction Task – Scroll

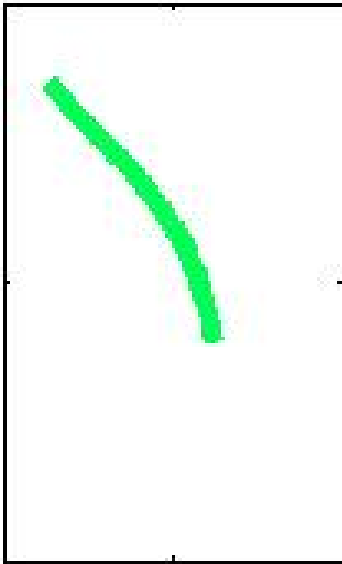# Virtual Interaction Task – Free-Form Drawing
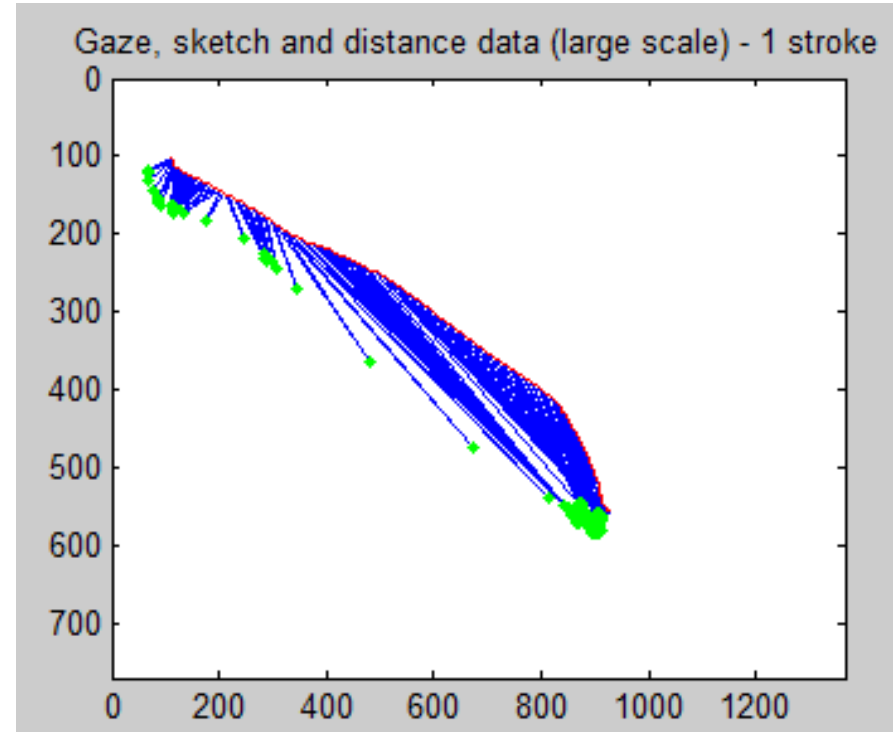
Virtual Interaction Task Exercise

Case #2

- **Exercise**
  - **Manipulate objects**
- **Observe human behavior**

Case #2
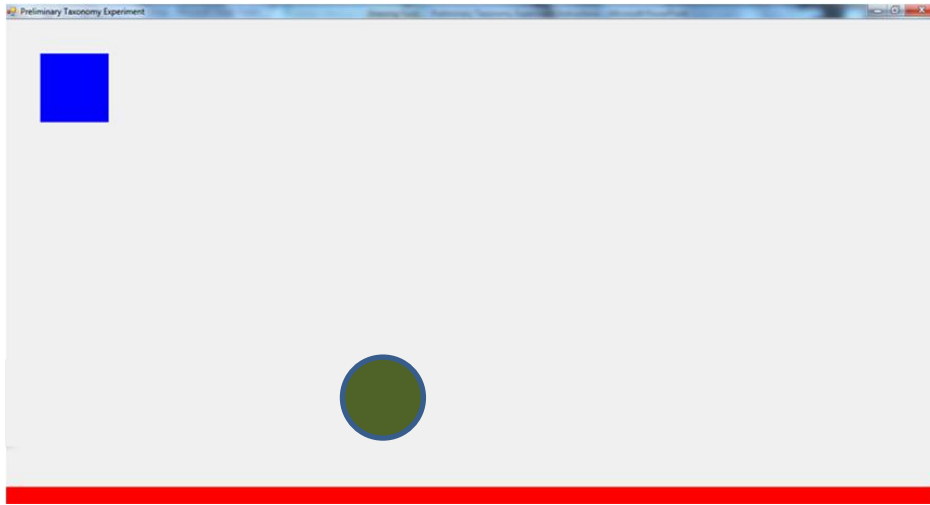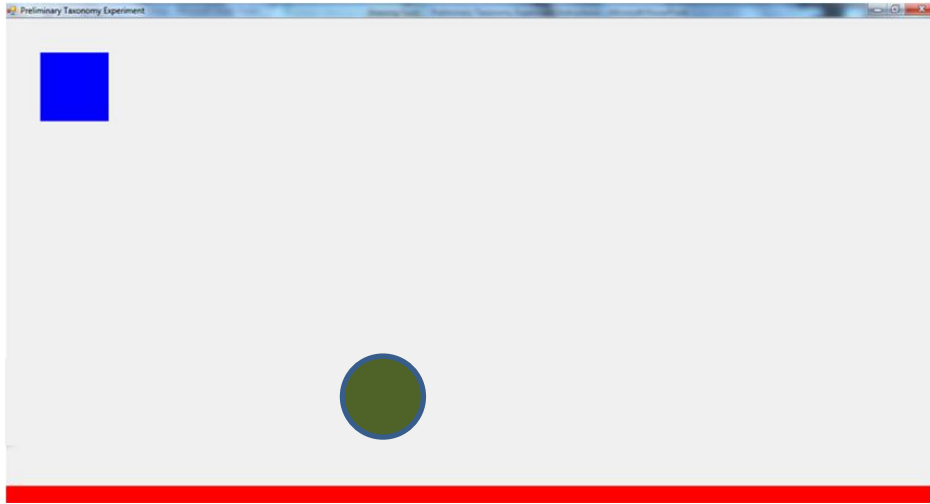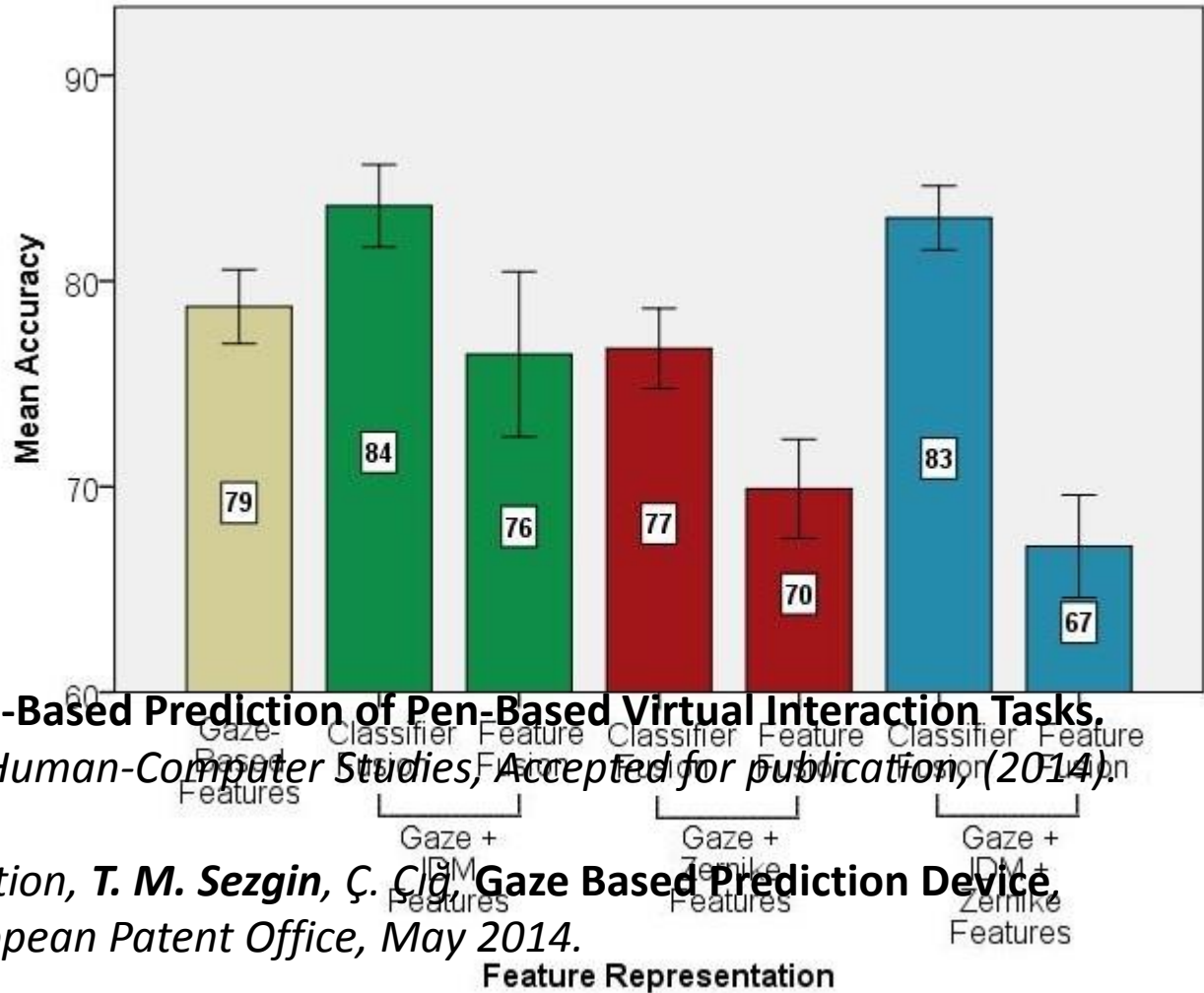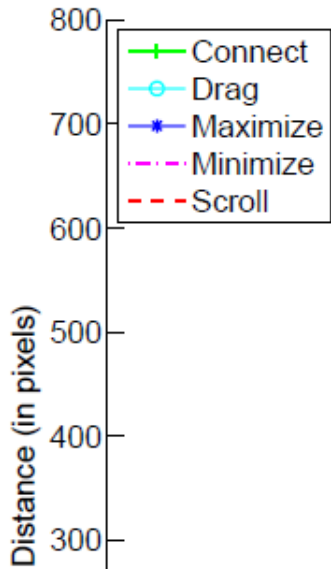
Gaze, sketch and distance data (large scale) - 1 stroke

Case #2

Case #2

Ç. Çığ, *T. M. Sezgin*, **Gaze-Based Prediction of Pen-Based Virtual Interaction Tasks.**
International Journal of Human-Computer Studies, Accepted for publication, (2014).

European Patent Application, T. M. Sezgin, Ç. Çığ, Gaze Based Prediction Device,
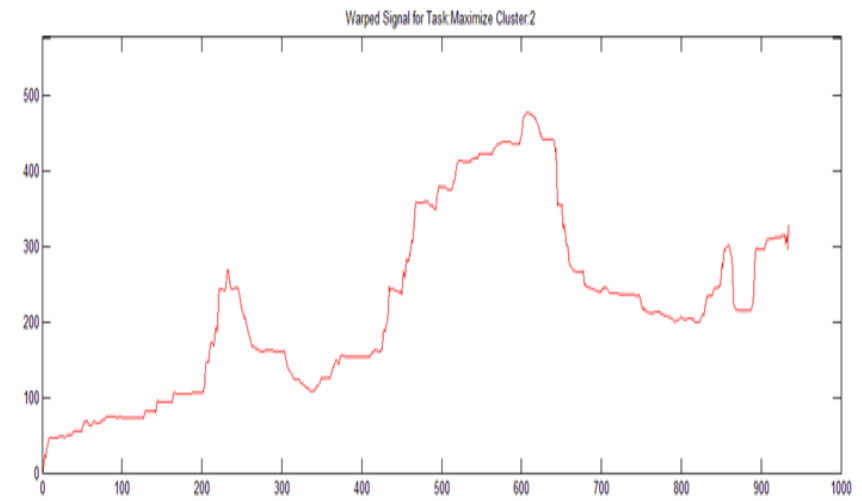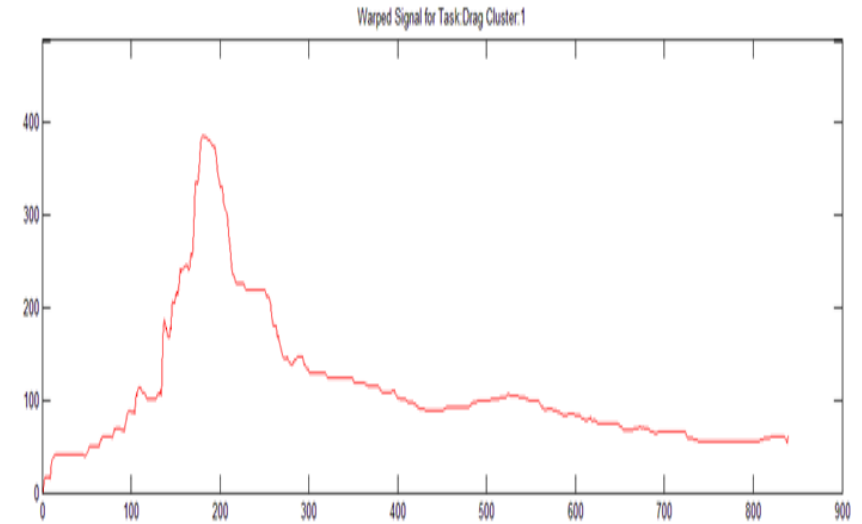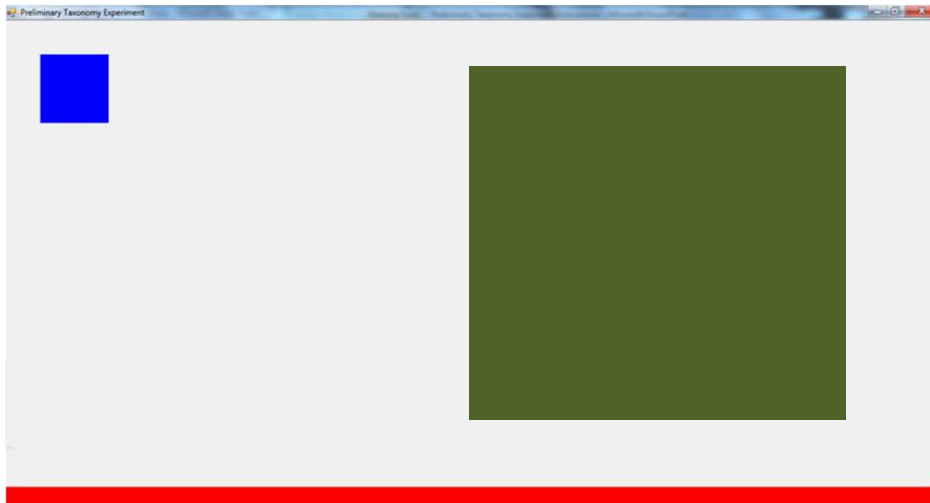*PCT/TR2014/00189, European Patent Office, May 2014.*

Case #2

- **Exercise**
  - **Manipulate objects**
- **Observe human behavior**
- **Practical use**
  - **Proactive UIs**
  - **Intent recognition**
  - **Fat finger problem**
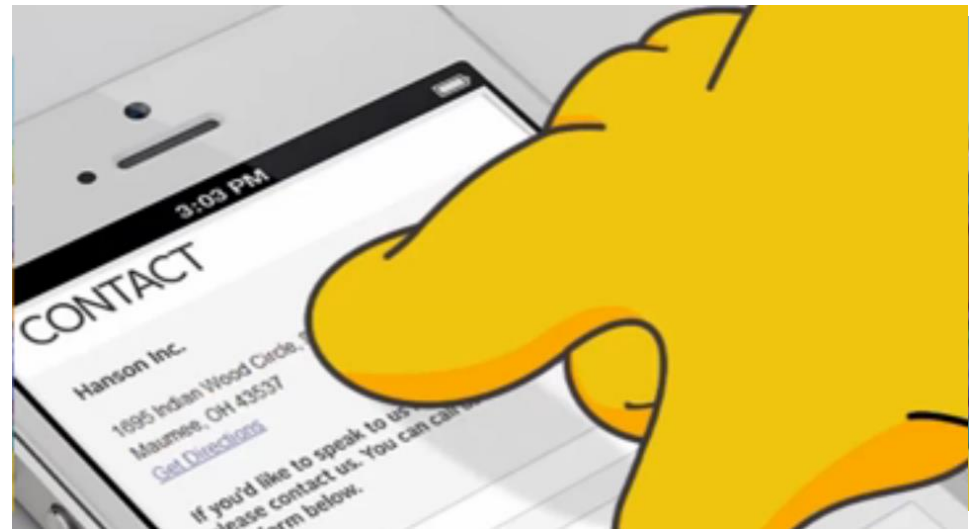
Achieve the non-obvious through exploitation of natural human behavior

- **Four step recipe**
  - **Many important cues go unnoticed**
  - **Carefully study your domain of interest**
  - **Discover previously unknown patterns**
  - **Exploit human-behavior**

Acknowledgements

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References

Invention Disclosures

**Under review*, O. Kalay., T. M. Sezgin, BBF # 2014.10.X*
Koç University, Research, Project Development and Technology Transfer Directorate

**Gaze-Based Mode Inference for Pen-Based Interaction*, Ç. Çığ, T. M. Sezgin, BBF # 2013.03.002*
Koç University, Research, Project Development and Technology Transfer Directorate

**Auto-Completion in Sketch Recognition*, T. M. Sezgin, B.Yanıkoğlu, Ç. Tırkaz, BBF # 2011.03.X*
Koç University, Research, Project Development and Technology Transfer Directorate

European Patent Application, T. M. Sezgin, Ç. Çığ, Gaze Based Prediction Device, PCT/TR2014/00189, European Patent Office, May 2014.

Publications

Ç. Çığ, T. M. Sezgin, Gaze-Based Virtual Task Predictor. Proceedings of International Conference on Multimodal Interfaces, Workshop Eye Gaze in Intelligent Human Machine Interaction: Eye-Gaze and Multimodality, Accepted for publication (2014).

Ç. Çığ, T. M. Sezgin, Gaze-Based Prediction of Pen-Based Virtual Interaction Tasks. International Journal of Human-Computer Studies, Accepted for publication, (2014).

Ç. Tırkaz, B. Yanıkoğlu, T. M. Sezgin, Sketched Symbol Recognition with Auto Completion. Pattern Recognition, vol 45, issue 11, pp 3926-3937 (2012).

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Questions