Assignment P4 (Summer 2021)

Rohit Kamboj
rohit.kamboj@gatech.edu

1 GOMS MODEL - CONTACTING A PROFESSOR

The GOMS model is shown below in Figure 1. The approximate time to execute an operator task is listed alongside the task[1].

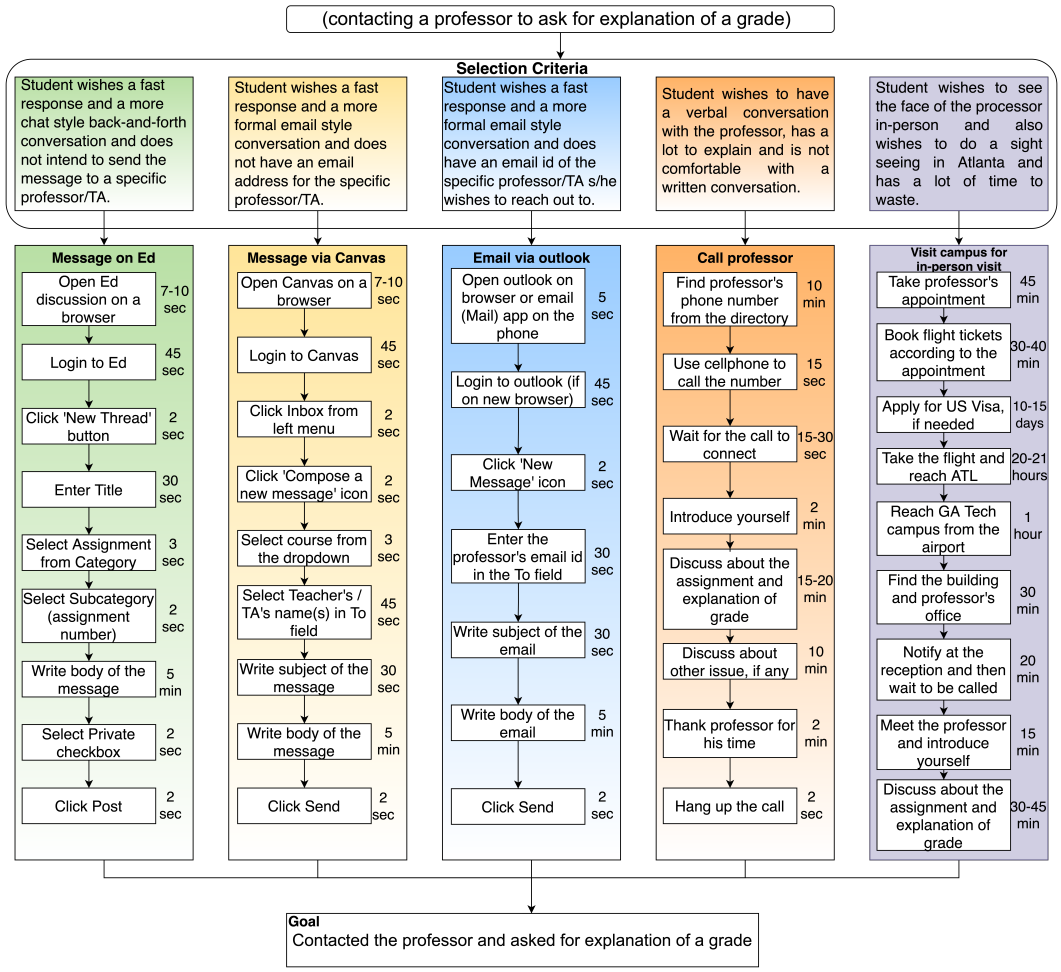

Figure 1—GOMS model for contacting a professor

1 Operators such as 'Book flight ticket' in the 'In-Person visit' method can easily be broken down into multiple sub operators such as opening travel site, searching for flights, selecting the flight, making payments and so on. Similarly, operators such as 'Take the flight to ATL' can be broken down into multiple operators such as reaching the airport and many sub operators related to the entire airport experience. These are not shown due to limited screen real estate.

2 HIERARCHICAL TASK ANALYSIS

The hierarchical task analysis as a plain text outline for submitting the assignment to Canvas and subsequently receiving one's grade and feedback is described below.

1. Complete an assignment
   (a) Prepare for the assignment
      i. View lectures on Ed
         A. Open website
            - Open browser on the desktop
            - Enter the URL https://edstem.org/us/courses/5912/lessons/ on the browser's address bar
            - Hit Enter
            - Wait for the page to load
         B. Scroll down to see the lecture '2.7 - Task Analysis'
         C. Click on the lecture link '2.7 - Task Analysis'
         D. Wait for the page to load
         E. Click on the first slide from the left menu
         F. Click on CC and then select 'Off' to turn off the closed captions
         G. Finish watching all slides using the auto-play feature
         H. Click on Lessons link on top to view the list of lectures
         I. Repeat B-G to watch the lecture '2.8 - Distributed Cognition'
      ii. View the assignment details
         A. Open assignment's website
            - Open browser on the desktop
            - Enter the URL http://omscs6750.gatech.edu/summer-2021/assignment-p4/ on the browser's address bar
            - Hit Enter
            - Wait for the page to load
         B. Read the assignment questions & the instructions (scroll if needed)
   (b) Finish writing the assignment and prepare the PDF
      i. Write the answers using overleaf
         A. Open overleaf website
            - Open browser on the desktop
            - Enter the URL https://www.overleaf.com/ on the browser's address bar

- Hit Enter
- Wait for the page to load

B. Click the project CS6750-HCI-P4
C. Type in the answers and when needed, refer to the questions (1.a.ii) and the lectures (1.a.i)
D. Click Recompile to generate the interim PDF
E. Review the PDF output generated
F. Use the scroll bar to scroll when needed

ii. Export the assignment
A. When all the answers are typed, click on Recompile
B. Review the PDF output generated (scroll, when needed)
C. Click on the download icon to Download PDF

iii. Review the final PDF
A. Open the Finder window on Mac
B. Click on Downloads folder
C. Double click on the downloaded file CS6750-HCI-P4.pdf
D. Wait for the file to open in Adobe Acrobat Reader DC
E. Verify the page limit and the JDF formatting specs
F. Close the Acrobat Reader by clicking on the red dot icon on the top left

(c) Upload the PDF on Canvas
i. Open Canvas site
A. Open browser on the desktop
B. Enter the URL https://gatech.instructure.com/ on the browser's address bar
C. Hit Enter
D. Wait for the page to load

ii. Login to Canvas
A. Enter GTAccount & password on the Georgia Tech Login Service page
B. Click Login
C. Wait for the page to load and show the authentication methods
D. Click on 'Send Me a Push'
E. Wait for notification on the connected device (instantaneous)
F. Unlock the phone and open Duo Mobile app
G. Click on the big green tick mark (Approve)

iii. Navigate to the course
   A. When login is complete, wait for Canvas dashboard to load
   B. From the canvas dashboard, select the tile for CS6750
   C. Wait for the course home page to load

iv. Locate the assignment to submit
   A. From the left sidebar, click 'Assignments'
   B. Wait for the page to load
   C. From the 'Upcoming Assignments' section, click on 'Assignment P4' link
   D. Click on 'Start Assignment' yellow button

v. Upload PDF
   A. Scroll down, if needed to view 'File Upload' section
   B. Click on the small gray 'Choose File' button
   C. Wait for the dialog modal to appear
   D. Navigate to the Downloads folder where the PDF was exported from overleaf (1.b.ii.C)
   E. Select the pdf file with the title CS6750-HCI-P4.pdf
   F. Once selected, click 'Open' from the file modal window
   G. Review the file name that appears to the right of 'Choose File' button
   H. Check the box to agree with the tool's End-User License Agreement
   I. Click on 'Submit Assignment' yellow button
   J. Verify 'Assignment submitted' appears on the right sidebar

(d) Receive grade and feedback

i. Receive and read email notification - *Trigger is an email from GATech about the assignment score being available*
   A. Unlock the phone upon receiving a new email notification
   B. Open Mail app and click on Inbox
   C. Click on the unread email which just arrived
   D. Verify the email is about Assignment P4's score being available
   E. Click back and then delete the email by swiping left

ii. View assignment grade and feedback in Canvas
   A. View assignment grade in Canvas
      - Navigate to the course home page on Canvas by following the steps from 1.c.i, 1.c.ii and 1.c.iii

- From the left sidebar, click 'Grades'
- Wait for the grades page to load
- Scroll down the page till 'Assignment P4' link is visible
- Check the score (number listed under the Score column) for that row

B. View assignment feedback in Canvas
- After checking the score (1.d.ii.A), click on the comment box icon which appears on the 'Assignment P4' row
- Wait for the bar to expand vertically
- Read the feedback provided under the 'Comments' header
- After reading, click the 'Close' link to close the comments

3 DISTRIBUTED COGNITION - BEFORE GPS NAVIGATION

The system in the context of navigating before the GPS comprises a driver, passenger, map, and road signs. Navigating to an address prior to GPS navigation would either require memorizing the directions before starting or make use of a printed map during driving. In the scenario of a married couple taking a drive (or a scenario where there are two or more people involved), the **driver** is responsible for acting with the system (car) and operating it to drive. The driver can offload the cognitive task of navigation to the passenger. With the distributed cognition, the driver can focus on the task of operating the vehicle. For the driver, the passenger becomes a part of the larger system, who in this case is helping the driver to offload the task of navigating. For a driver, there is no need to perform cognitive activities such as memory and perception. The driver however would need to keep the provided directions in their short-term memory so that they can be acted upon.

For a **passenger**, one option is to memorize the directions and help the driver take turns accordingly. The passenger, however, can offload some of the cognitive load to a paper map. Using the paper map artifact in the context will help the passenger to offload the task of memorizing the directions. In the case when a driver takes an incorrect route, the passenger has to act according to the situation and come up with new directions, using the map. The passenger or the navigator is responsible for a different set of cognitive activities. These include perception. The navigator reads the map and uses their perception to track their actual location with regard to the map. The passenger makes use of reasoning to

come up with the directions. They may have to choose between different route options. Additionally, the passenger also is required to keep in their memory about dictating the directions to the driver at appropriate times.

The third key artifact in the system is the **map**. The map provides the most vital cognitive task in the system, which is perception, though implicitly. It helps both the passenger and the driver to make their own perception about their current location and the steps they need to take to reach their desired destination. The map in this case is analogous to the pages in the flight's cockpit indicating various speeds. It is therefore a key part of the system but it cannot act on its own. We need a human resource to read and interpret the map.

Another part of the system are the **road signs**. It helps the driver to take action (acting). For example, a speed sign helps the driver to take action and make adjustments to the speed. The yield sign helps in the perception and reasoning of the driver to stop and yield for the incoming traffic. Similarly, the signs carrying the name of the road, intersection, or the interstate helps the passenger with their task of navigation. The signs help build the perception of the passenger to identify their current location on the map.

In contrast, in the situation with a lone driver using a GPS, from the perspective of distributed cognition, a major chunk of the task of using the map, dictating the directions gets offloaded from the driver to the navigation system. However, with GPS navigation, there is no social interaction between the driver and the system like it is when the passenger is part of the system. In both scenarios, either the GPS system or the passenger dictates the direction to the driver. In case the driver misses hearing the directions, with a passenger, the driver can ask the passenger to repeat the directions. With the GPS system, this becomes difficult unless the driver intentionally makes a wrong turn which the GPS can detect and then dictate the updated directions to the driver. The passenger also can adapt according to the perception s/he has about the driver. For example, if the driver needs to know about an upcoming turn a few minutes before the actual turn, the passenger can comply. For a GPS system, this might not be possible and the driver will need to act according to the situation.

The above system not only demonstrates the use of distributed cognition but also of **social cognition**. Social cognition is the key to success in the former scenario where the navigation app is not used. Without interaction between the

driver and the passenger, the system will be highly inefficient and dangerous as it would require the driver to use the map along with driving. Coordination and relationship between the driver and the passenger is important for the success of the system. If the navigator fails to provides the direction (intentionally say due to conflict) or the driver stops listening to the directions from the passenger (maybe due to an argument or say ego), in either case, the system is doomed.

4 DISTRIBUTED COGNITION - HCI

In one of the previous assignments, I described the task of cleaning or mopping the wooden floor of my house. The task involved using a robot vacuum. The cognitive system at a high level includes me (a human whose goal is to get the floor cleaned), the floor which is being cleaned, the vacuum device used for cleaning, and a phone app that is used to control the device. The representation is shown in Figure 2.

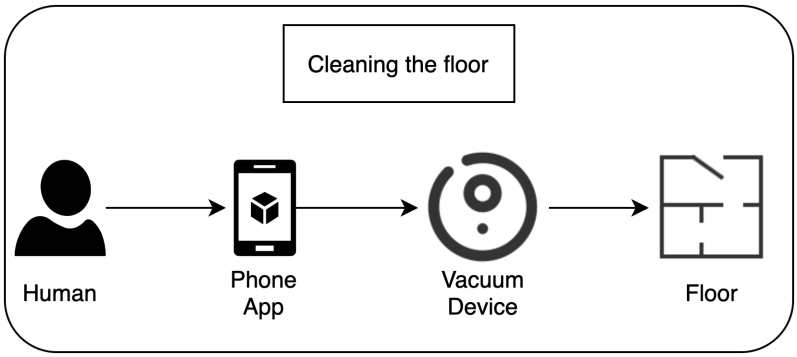

Figure 2—Task and pieces of the system

The activity of mopping can be done by humans themselves. However, using a device such as a vacuum cleaner helps to offload the daunting physical task from the human. The human takes the action by setting up the vacuum device and by operating the app. The **reasoning** is another cognitive role that is performed by a human. The reason that the floor needs to be cleaned itself is the trigger point of the task.

Memory is one of the cognitive tasks which gets offloaded from human to the device. The device can be configured via the app to start cleaning on a set schedule, say every Saturday at 9 AM. This offloads the task of remembering to start the cleaning process from human to the app. The task here is getting offloaded not to the device but to the app. The device itself has no intelligence about the

schedule. The app takes that responsibility and then activates the device.

The smartphone app in this context provides the cognitive task of **perception**. It has to track the perception of the floor map being cleaned. The app also provides a perception of the layout and various settings to the user using which the vacuum device can be controlled. The perception is provided to the user based on which the user takes an action. Similarly, the device provides a perception both to the app and to the user that it is cleaning the floor and that the portion of the floor the device has already covered is now clean.

Action is a cognitive task which the device takes. It performs the action of cleaning the floor. This is similar to how a driver in our previous example drives the car or similar to the role of a pilot in the cockpit. The vacuum device performs the cleaning action on the floor. Similarly, when directed, the app takes the action of communicating with the device and passes on the commands which the user wants the device to perform. It acts as a liaison between the user and the vacuum device. This is similar to how a paper map acts between the driver and the passenger.

None of the pieces described above can act independently. They have to work in tandem with each other, playing their respective part in the overall task.