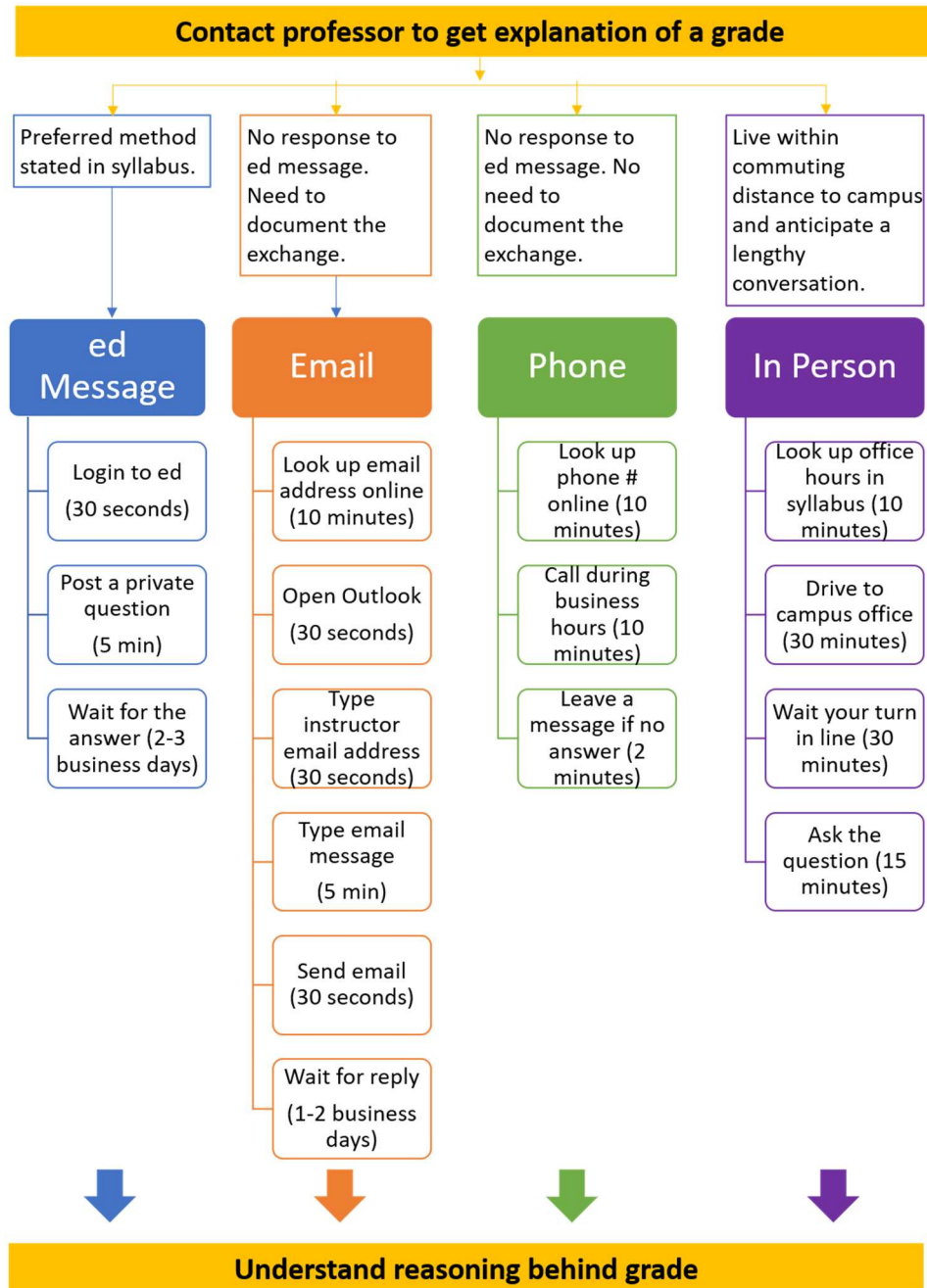


P4

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1 GOMS MODEL



2 HIERARCHICAL TASK ANALYSIS

Submit assignment P4 and receive grade and feedback

1. Complete the assignment

1.1. Retrieve the assignment

- 1.1.1. Click on Google Chrome shortcut on PC desktop
- 1.1.2. Click on bookmark to full calendar for CS6750
- 1.1.3. Scroll down and click on link to Assignment P4

1.2. Do the assignment

1.2.1. Start the homework template

- 1.2.1.1. Click on Windows Start>Word icon to launch Word
- 1.2.1.2. Click File open to select the JDF 2.2 Starter
- 1.2.1.3. Update the header with assignment number
- 1.2.1.4. Click File Save a Copy
- 1.2.1.5. Name file P4
- 1.2.1.6. Save the file

1.2.2. Complete question 1

- 1.2.2.1. Read question 1
- 1.2.2.2. Refer to key notes from lecture 2.7
- 1.2.2.3. Type the answer for question 1
- 1.2.2.4. Click the save icon in Word to save the document progress

1.2.3. Complete question 2

- 1.2.3.1. Read question 2
- 1.2.3.2. Refer to key notes from lecture 2.7
- 1.2.3.3. Type the answer for question 2
- 1.2.3.4. Click the save icon in Word to save the document progress

1.2.4. Complete question 3

- 1.2.4.1. Read question 3
- 1.2.4.2. Refer to key notes from lecture 2.8
- 1.2.4.3. Type the answer for question 3
- 1.2.4.4. Click the save icon in Word to save the document progress

1.2.5. Complete question 4

- 1.2.5.1. Read question 4
- 1.2.5.2. Refer to key notes from lecture 2.8
- 1.2.5.3. Type the answer for question 4
- 1.2.5.4. Click the save icon in Word to save the document progress

1.2.6. Save as PDF

- 1.2.6.1. Click File
- 1.2.6.2. Click Save A Copy
- 1.2.6.3. Click file type drop down
- 1.2.6.4. Click PDF
- 1.2.6.5. Click Save
- 1.2.6.6. Close Word

1.3. Submit the assignment

1.3.1. Login in Canvas

- 1.3.1.1. Click on Google Chrome shortcut on PC desktop
- 1.3.1.2. Click on the buzzport bookmark
- 1.3.1.3. Click the Canvas icon
- 1.3.1.4. Click the tile for CS6750

1.3.2. Go to assignment

- 1.3.2.1. Click assignments on the left pane
- 1.3.2.2. Click assignment P4 under upcoming assignments

1.3.3. Submit assignment

- 1.3.3.1. Click start assignment button on top right
- 1.3.3.2. Click Choose File button
- 1.3.3.3. Click recent local pc folder containing assignment
- 1.3.3.4. Click on P4 PDF document in file explorer
- 1.3.3.5. Click the Open button
- 1.3.3.6. Click the checkbox to agree to the terms of Canvas
- 1.3.3.7. Click Submit Assignment button

1.3.4. Verify submission

- 1.3.4.1. Click Download P4.pdf on the right side of the page
- 1.3.4.2. Verify the correct document was successfully submitted

1.3.5. Close the PDF

1.3.6. Close Google Chrome

2. Receive grade and feedback

2.1. Check emails

- 2.1.1. Every day, click Outlook shortcut
- 2.1.2. Read emails from the instructor
- 2.1.3. Receive email grade is posted

2.2. Login to Canvas once grade is posted

- 2.2.1. Click on Google Chrome shortcut on PC desktop

- 2.2.2. Click on the buzzport bookmark
- 2.2.3. Click the Canvas icon
- 2.2.4. Click the tile for CS6750
- 2.3. Go to grades page
 - 2.3.1. Click grades on the left pane
 - 2.3.2. Scroll down the page
 - 2.3.3. Click assignment P4
- 2.4. Read comments on the lower right
- 2.5. See grade on the top right

3 DISTRIBUTED AND SOCIAL COGNITION WITH GPS

3.1 Before GPS

Before GPS was readily available for drivers, navigation while driving a car was done with the use of a paper map. It was typical for the passenger to hold the map and be responsible for navigating and calling out directions to the driver. If the drive was particularly difficult or unfamiliar, a compass may have been consulted if they got lost or disoriented. This is an example of a distributed cognition system. Table 1 below shows the various members of the system and the cognitive activities they perform.

Table 1 — Map navigation system members and their cognitive roles

System Member	Perception	Memory	Reasoning	Acting
Driver	Perceives the speed of travel from the car odometer. Listens for emergency vehicles and horns of other cars. Must watch for roadway signs and warnings. Must listen for queues from the navigator.	Short-term memory must contain the next set of instructions from the navigator.	Decides how close to get to other vehicles and when to speed up or slow down.	Drives the car by pressing on the gas, steering the wheel, and using the brake. Turns the vehicle when instructed by the navigator.

Navigator	Must perceive where the car is relative to the map by referencing street signs and landmarks. Must listen to questions from the driver when doubt is raised about where or when to turn.	Remembers the long-term goal or destination. Must remember at least the next planned turn.	Computes the overall route to take and when to instruct the driver to turn. Must reason where they are on the road in relation to the paper map.	Must read the map and road signs and speak the directions to the driver.
Paper Map		Remembers the layout of roads, mile markers, and route options.		
Car			Calculates the speed of travel.	Moves the passengers along the road. Communicates the speed of travel to the driver through the speedometer.
Roadway Signs				Signals to the navigator and driver the current location.
Compass	Perceives the direction of travel: north, south, east, etc.			Communicates direction of travel to the navigator.

3.2 Lone Driver with GPS

Once GPS became a commodity tool available to most drivers, the need for another passenger to navigate was reduced. The GPS has the map and compass built-in, along with an auditory component that talks to the driver. Table 2 below shows the various members of this new system and the cognitive activities they perform.

Table 2 — GPS system members and their cognitive roles

System Member	Perception	Memory	Reasoning	Acting
Driver	Perceives the speed of travel from the car odometer. Listens for emergency vehicles and horns of other cars. Must watch for roadway signs and warnings. Must listen for queues from the GPS. May also look at the GPS map if directions are unclear.	Short-term memory must contain the next set of instructions from the navigator.	Decides how close to get to other vehicles and when to speed up or slow down.	Drives the car by pressing on the gas, steering the wheel, and using the brake. Turns the vehicle when instructed by the GPS.
GPS	Must perceive where the car is relative to the map by referencing satellite tracking. Perceives the direction of travel: north, south, east, etc.	Remembers the long-term goal or destination. Remembers the turn-by-turn directions for the whole route. Remembers the layout of roads, mile markers, and route options.	Computes the overall route to take and when to instruct the driver to turn. Reasons where they are on the road in relation to the paper map and the approximate time of arrival.	Speaks the directions to the driver. Communicates direction of travel to driver.
Car			Calculates the speed of travel.	Moves the passengers along the road. Communicates the speed of travel to the driver through the speedometer.
Roadway Signs				Signals to the driver the current location.

The social components that are present with a human navigator are many. The navigator may misinterpret the location of the car in relation to the map. The navigator may also misinterpret how far it is until the next turn and relay the information too late for the driver to safely turn. The driver may take the wrong turn if he or she does not correctly interpret the instructions from the navigator. This can result in further arguments between the driver and navigator about who is at fault for the mistakes. The two people may also disagree with how to rectify the mistake or disagree with where they are in relation to the map. These frustrations can be an additional cognitive distraction to the driver who may become consumed with emotion about the disagreement rather than paying attention to the task of driving. This social component does not exist with a single driver and GPS. The driver may be confused with the GPS but would generally not be as emotional about it as they may be with another human involved. These factors are not considered when looking at the system solely from a distributed cognition point of view.

4 DISTRIBUTED COGNITION WITH COOKING THANKSGIVING DINNER

Every year I cook a big meal to celebrate the United States' Thanksgiving holiday. I always include cooking a whole turkey and mashed potatoes with gravy. This task is complicated because there are multiple interfaces that must be used in tandem.

The system includes the oven with roasting pan, the stove with a pot, and an Instant Pot pressure cooker. The first step for me, the cook, is to prep the turkey and cook it in the oven. The oven interface includes a control for the temperature and a timer. I use the timer to set times to baste the turkey and check the temperature. I use a meat thermometer to check the turkey's temperature and gauge how much longer the turkey needs to cook. When it is about an hour away from being done, I start cooking the potatoes in the Instant pot. It has an interface to set the amount of pressure and cooking time. When the time is up the device stops cooking and gives an auditory alert. The machine is so consistent at cooking that I do not need to check if the potatoes are done. When the turkey is done, I cook the gravy in a pot on the stove. The stove interface has controls for the temperature of the burner. I must perceive if the flour and butter mixture is too hot or too cold and adjust the temperature myself. I do not use a recipe.

The table below describes the cognition tasks that each member of the system takes on.

Table 3 — Thanksgiving dinner system members and their cognitive roles

System Member	Perception	Memory	Reasoning	Acting
Human Cook	Perceives the reading from the meat thermometer and the auditory alerts from the oven and instant pot timers. Must also perceive the color and temperature of the gravy roux.	Remembers the order of steps necessary to complete the meal. Remembers the ratios of each ingredient to use. Remembers the target temperature for the turkey is 180°F.	Decides when to change the temperature of the gravy, when to start cooking the potatoes and how long to set the timer for on the oven. Decides when the meat is done based on the thermometer reading and target temperature.	Prepares the turkey for the oven. Sets oven temperature and timer. Loads Instant Pot and sets the pressure and timer. Adds ingredients for gravy and actively cooks and stirs. Turns appliances off when finishing each task.
Oven	Perceives the current temperature in relation to the set temperature.	Remembers the goal temperature. Remembers the time remaining.	Computes whether to keep adding heat. Computes time remaining.	Produces heat for cooking.
Gas Stove		Remembers the set level of heat.		Produces heat.
Instant Pot	Perceives the pressure of the food.	Remembers the goal pressure. Remembers the time remaining.	Computes whether to keep adding energy. Computes time remaining. Decides when to shut off.	Produces heat. Turns off when done.
Thermometer	Perceives the current temperature of the turkey.			Displays turkey temperature.