INF5820/INF9820: Obligatory Assignment 1

The deadline for the submission of this assignment is **September 26th, 23:59**. The assignment must be submitted via the Devilry portal:

`http://devilry.ifi.uio.no`

The assignment will be marked as pass/fail, together with detailed comments and corrections of course. Every part of the assignment is important and requires some time and attention. That means that partially submitted assignments with answers to only half of the exercises will be marked as "fail". The assignment must be submitted individually, but you are of course free to collaborate with others, as long as everyone participates actively in the process.

If you have any questions or problems regarding the assignment, don't hesitate to contact me at anytime: `plison@ifi.uio.no`

1 Analysis of spoken dialogue

Here is a short invented dialogue:

SPEAKER A: : Hi there! So, how was your day?
SPEAKER B: : Well, my boss put one more big pile of work on my desk today, as if I didn't have anything else to do...
SPEAKER A: : Poor you... Oh, while you're up, could you help me carry these groceries in the kitchen?
SPEAKER B: : Sure will do. Oh, did you see Mark's email today?
SPEAKER A: : Which email?
SPEAKER B: : Mark's. He sent it this afternoon I think
SPEAKER A: : Mm no I didn't check my email this afternoon
SPEAKER B: : Oh I see
SPEAKER A: : So what was he saying?
SPEAKER B: : Uh?
SPEAKER A: : What was he saying?

SPEAKER B: : Well he was asking whether we had something planned on the 28th

SPEAKER A: : The 28th? But we already hav/

SPEAKER B: : Yes I know, we'll be in Trondheim that day.

SPEAKER A: : Too bad, we haven't seen him for quite some time!

SPEAKER B: : Yeah... you know what, why don't you tell him that we're busy on the 28th, but that we have nothing planned for the following weekend?

SPEAKER A: : Good idea!

Analyse the dialogue using the concepts we have seen during the lecture on spoken dialogue:

1. How are the dialogue turns structured?[1]
2. What kind of speech acts can you find in the dialogue (according to e.g. Searle's taxonomy)?
3. What are the grounding signals & strategies used through the dialogue?
4. Can you find some examples of conversational implicatures?
5. Finally, list a few deictic markers occurring in the dialogue.

2 Insights from cognitive science

Read the following article (URL on the pensum webpage):

Michael Tomasello, Malinda Carpenter, Josep Call, Tanya Behne, and Henrike Moll: "Understanding and sharing intentions: The origins of cultural cognition" in *Behavioral and Brain Sciences*, 2005. CUP. 28, 675-735.

Once you have finished reading the article, describe in one or two paragraphs the concept of "shared intentionality" used by the authors, and explain why this concept is (in their view) crucial for understanding social interactions among humans, and verbal interactions in particular. NB: you don't have to read the open peer commentary, nor the section entitled "Apes and children with autism".

[1] Obviously, a lot of information regarding the non-verbal cues, the intonation and the context are not available on the transcript, but there are still some boundary markers to find.

3 Phonetics

Download *Praat*:

`http://www.fon.hum.uva.nl/praat/`

1. With *Praat*, record your own voice on an utterance such as "My taylor is rich", and produce the figures corresponding to:

   - The waveform;
   - The pitch;
   - The intensity;
   - The spectrogram and its formants.

   Add these figures to your assignment, and explain in a few words the information that you can draw from these figures. In particular, explain:

   - whether you are able to observe any word boundaries on the waveform;
   - how to detect the presence of stops and fricatives directly on the waveform;
   - what the pitch variation can tell you about the intonation of the utterance;
   - what the formants on the spectrogram can tell us about e.g. the distinction between vowels.

2. Create an artificial sound (New $>$ Sound $>$ Create Sound from Formula) corresponding to the superposition of the three following waves:

   - A wave with amplitude 2.1 and frequency 47 Hz
   - A wave with amplitude 3.2 and frequency 116 Hz
   - A wave with amplitude 0.49 and frequency 203 Hz

   The other parameters (channels, duration, sampling frequency) should be left to their default value. We'll now calculate by hand the intensity of this wave, using 11 sample points, each at a 0.1 s interval, e.g.

   $$[0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0]$$

   For each of these time points, write down the amplitude value of the sound at that time (Select $>$ Move cursor to). When you have your 11 values, calculate the intensity (in dB) using the formula shown during the lecture.

4 Probabilistic modelling

1. Assume we are throwing a biased (e.g. crooked) dice, which has the following probability mass function:

$$P(X = i) = \begin{cases} \frac{1}{8} & \text{if } 1 \leq i \leq 4 \\ \frac{1}{4} & \text{if } 4 < i \leq 6 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

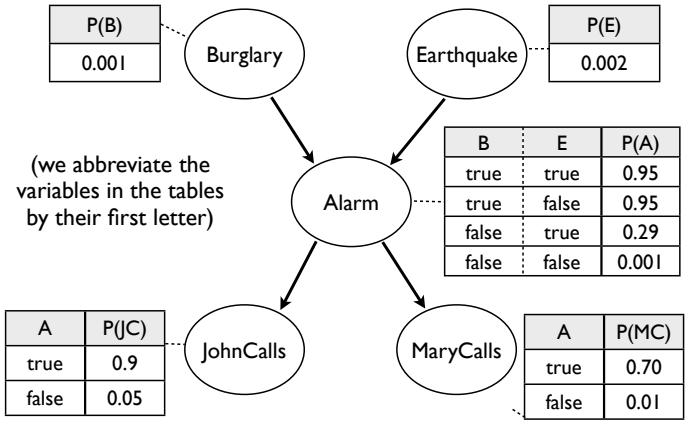
   Calculate the expectation and variance of this dice.

2. An uniform, continuous probability distribution on the interval $[a, b]$ can be expressed by the probability density function:

$$f(x) = \begin{cases} \frac{1}{b-a} & \text{for } a \leq x \leq b \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

   Assuming an interval of $[1, 6]$, calculate the probability that $P(2 < X < 3)$, showing your calculations (using the definite integral).

3. Consider the example of Bayesian Network seen during the course:



   Based on this Bayesian Network, compute the probability distribution for $P(Burglary|JohnCalls = True, MaryCalls = False)$. Don't forget to show the details of your calculation, step by step.