Affective Computing
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Week - 03
Lecture - 01
Part - 1
Affect Elicitation

Hi friends, so welcome to this week class. So, in this week we are going to talk about some very interesting things, more importantly we will be talking about the Affect Elicitation. That is the process through which the emotions are induced among the human subjects; of course we would like to restrict ourselves to the human subjects for the sake of this course.

And more importantly while doing so in order to ensure that it is all being done in an ethical fashion we will be reviewing the experimental methodology as well including the role of the institutional review board. And finally we will end the lecture with the discussion of the research and development tools which are in the various categories including the data annotation, machine learning and so on so forth.

And so this is basically to enable even the learners from the non machine learning domains as well to be able to work in affective computing with same efficiency. And as part of this discussion only we will be doing a tutorial as well which is going to do a demonstration of the Psycho pi tool.

So, let us just quickly dive in in the Affect Elicitation. So, the affect elicitation we have to understand that we need to be able to reliably and ethically induce the emotions among the human subjects, in order to understand and develop the emotionally intelligent machines.

And there are different ways in which the emotions can be induced and similarly there are different ways in which the emotions can be collected, the induced or the elicited emotions can be collected from the human experts. So, in this particular module we will be discussing that what are the different ways in which the affect elicitation can be done, what are the different stimulus that are there for us and what are the different ways in which the those

different stimulus they vary in terms of the advantages and their disadvantages and for certain type of experiments you may want to use one stimulus over the other right.

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Dataset of emotional expressions

1. Acted or posed Expressions obtained by asking individuals, often actors, to portray emotions
   i. Easy to collect ✓
   ii. Ecological validity of data is a concern ✓
2. Naturalistic display of emotions
   i. Ecologically valid ✓
   ii. Notoriously difficult to collect ✓
3. Induced Expressions, in which emotional responses are elicited via some stimulus;
   i. Middle road

data collection ↑ ↓
Validity ↑ ↓

So, let us just quickly dive in the Affect elicitation. So, when it comes to the affect elicitation let us first try to look at the different categories of the data sets which are available for the emotional expressions. So, all the data sets as of now which are available for the emotional expressions can quickly categorized into 3 different categories. So, one category is known as the Acted or the Posed Expressions.

Now, acted or the posed expressions as the name itself suggests, what it means that in this particular type of category the actors which could be the common individuals or often the professionally trained actors, can be asked to portray a particular type of emotion and then that particular type of emotion is captured.

Let us say in the in using the camera sensors or let us say using the audio modalities. So, whatever the modalities that you are interested in getting the data captured. So now, in this it is quite easy actually to collect because you can say. So, for example, you can ask an individual make a pose of a smile and the individual starts smiling.

So for example, right now I am a bit smiling right and now you are collecting the data when I am smiling, so that is what is the acted emotion and so it is quite easy to collect. Of course, if you have a professionally trained artist then it makes the life much easier, because professionally trained artist which would be better able to mimic the expressions that you want them to mimic right. So, they can become happy they can become sad they can become angry and so and so forth. So, this is quite easy to collect. So, I think that is very easy to understand.

But now as you can see about the second point the ecological validity of the emotions collected in this fashion is of concern. Why this is of concern? Because we all know that for example, if you are asking an individual or if you are asking a professionally trained artist to smile or to laugh even or to express happiness, the individual is just expressing the happiness or mimicking the happiness, but individual may or may not be happy within right.

So, the actual state of the happiness that the individual is actual state of the emotion that the individual has may or may not be getting reflected through the emotions that are getting portrayed on the surface right and for the same reason the ecological validity of the data is a big concern here.

So, while maybe you know you are capturing the let us say the facial expressions facial expressions could be ok. But let us say if you decide to capture or analyse or understand the brain signals at the same time the polygraphy signals. For example, the EG signals at the same time that may not give you a very good result because the actual emotional state of the individual may or may not be the same as what the individual is representing.

So, I hope that this is a bit clear and for the same reason while this type of data sets which are using the acted or the posed expressions are while they are very easy to collect, but their ecological validity is always a bit of concern. So, they lie on the one side of the spectrum.

Similarly, now we have a different category of data sets as well which is known as the Naturalistic which constitutes of the Naturalistic display of the emotions. Now in the naturalistic display of the emotions as the name itself suggests this is completely on the other side of the spectrum.

So, you are not asking an individual you are not asking an actor to mimic a particular emotion, rather you are collecting a particular emotion emotions expression when it is being displayed in a natural setting in a natural fashion right. So, for the same reason the ecological validity of the data is very high or it is very valid, because if I am smiling in a natural setting it may very well mean that maybe I am happy very I am happy within as well right.

So, all my all my modalities all the modalities of my body including my facial expressions, my smile, my audio my physiological signals my brain signals they all are going to represent the same emotion that I am actually in right. So, for the same reason the ecological validity is quite high.

Now but of course, you can very well imagine on the other side the problem with this type of data set is that it is quite difficult to collect. Why is it so difficult to collect? Of course, now imagine that you want to have a data set of happy emotions, sad emotions, angry emotions. Now, you will have to first identify the individuals and look for the individuals who are happy in their natural setting, who are happy in their natural, who are sad in their natural setting, who are angry in their natural setting?

And you will have to imagine you know just take your bag of sensors and you will have to run behind them and chase them and see when they are getting happy, when they are getting sad, when they are getting angry etcetera and then only you will quickly put up the sensors

and you will start collecting the data right. So of course, that is not very easy task to do and in some cases it could be quite impossible task to do.

So, for the same reason the data collection itself can be very very difficult and nevertheless in many cases you may have seen that people they just take the camera and then they start shooting taking the pictures, when the people are happy in their natural settings.

But then there are ethical concerns also that are related to it right, you cannot just violate the privacy of an individual or of a group of individuals and it is only polite and ethical to even ask before even collecting their data; even if they are showing some emotions in a natural settings right.

So, these are the some restrictions and some disadvantages some problems that are associated with the naturalistic display of the emotions and for the same reason there are very few or I would say very limited number of data sets that may be there even which are constituting this type of emotions perfect.

So, 2 categories first is the acted category completely portrayed emotions, second is the naturalistic category where you have a expression of emotions which is very naturalistic and third category which is really lies in the middle of these 2 categories which is known as the induced expressions.

So, basically in the induced expressions what is being done is that emotional responses are elicited using some stimulus and this is sort of as I said is in the middle of both the type of the data sets. So, on the one hand when I say it is in the middle of this thing the when it comes to the data collection efforts, of course the data collection efforts in the induced expressions are going to be a bit higher than the let us say than the acted or the posed expressions right.

But then it is going to be definitely a bit lower. So, maybe if I just look at the collection data collection efforts, if I look at the data collection efforts then this is going to be a bit higher

than the acted or the posed expressions. But then at the same time this is going to be lower than the naturalistic display of the emotions right.

Similarly, if you were to look at the validity or the ecological validity of the data, then with respect to the ecological validity the ecological validity of induced expressions is going to be a bit more than the acted or the induced expressions. But at the same time the ecological validity is going to be lower now in this case than the naturalistic display of the emotions.

So, I hope that this is now clear that there are three categories in which the data sets of the emotional expressions are present acted, naturalistic and induced. Acted lies on the one side of the spectrum naturalistic lies on the other side of the spectrum and induced is something that is in the middle of the spectrum perfect.

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Emotion Elicitation

1. Passive or perception based
   - Individuals observe stimuli, such as film clips, images or music that are designed to evoke particular feelings or methods

2. Active or Expression based
   - Individuals are instructed to perform particular behaviours that might naturally evoke different emotions, such as posing facial muscles, adopting body postures or interacting with other people.

So, having understood what are the different categories in which the data sets are present and now that we have understood that the third category that is in which the expressions are induced is lies in the middle. So, we would like to focus our attention more on the induced expression category. So, basically in the induced expression categories as we just saw that the emotional responses are elicited via some stimulus.

Let us look at that what are the different ways in which the Emotion Elicitation can be done. So, primarily the emotion elicitation can be done in 2 ways first is known as the Passive or the perception based emotion elicitation. In the passive or the perception based emotion elicitation the individuals they look at a particular stimuli which could be an image, could be a music, could be a film clip.

And these stimulus they evoke a particular type of a feeling, particular type of emotion among the individuals. And while the individuals are experiencing these emotions their some their data in terms of certain modalities which have been pre identified such as audio, visual, physiological signals, brain signals so on so forth is being collected.

So, that is what is known as the passive or the perception based. It is known as passive because the other than watching other than experiencing looking the individual is not really doing something right, the individual is not playing the participant is not playing a very active role here so right. So, that is what is the perception or the passive emotion elicitation.

Now, of course, on contrary to the passive or the perception based elicitation we have the Active or the Expression based elicitation. So, active or expression based elicitation as you can rightly understand understood now that this is just opposite of the passive emotion elicitation.

In which in this what happens that the individuals are asked to perform particular behaviours, please pay attention here that rather than observing a particular stimuli rather than simply observing a particular stimuli the individuals are now being asked to perform a particular behaviour that might naturally evoke different emotions right.

So, for example as simple as that posing facial muscles as simple as that. So, for example, if I were to put this pen in my mouth which I am not going to do, but if I were to put this pen in my mouth something like this it means I am hindering my facial expressions from smiling; I am inhibiting the smile right I am preventing I am sorry I am preventing my face to from my face to do a smiling face.

Similarly, if I were to put this pen in my teeth like this you know. So, I am making an expression like this. So, I am forcing myself to smile right something like that. Similarly you can adopt lots of different types of body postures or you can be interacting with the people in a particular fashion.

So, that a particular emotion is being elicited and then of course, while these particular emotions are being elicited again we can use predefined set of sensors modalities in which we want to collect the data and the data collection can be done right. So, then this is quite simple first category Passive or the perception based, second category Active or the Expression based.

Now if I were to ask which category of which of these 2 categories is easier to collect the data and which of this is a bit harder to collect the data. What do you think? Well of course, the answer would be that the passive or the perception based would be easier in comparison to the active or the expression based.

Why because of course, the for more or less for the same reasons that we have seen the data sets earlier that you are not really asking the individuals to do lot of things right. So, individuals are just playing a passive role and hence it is being easy it is relatively easy to capture their data and perhaps it gives you more control of the environment to collect the data and hence to have a standard data set right perfect.

So, we talked about the emotion elicitation one is the passive based, one is the active based.

Passive Methods: Images

1. The presentation method is standardized such that all the individuals have the same viewing experience;
   - E.g. the images could be presented for 10 seconds on a computer screen that is at a fixed distance; with a constant screen resolution, screen brightness, and image size (Monkaresi et. al, 2012).

2. The images can be selected on the basis of which emotion should be elicited from a database of standard images.
   - International Affective Picture System (IAPS)
   - Genova Affective Picture Database (GAPED)

Let us look at now the passive let us look in more detail about the what are the different ways in which we can do the passive emotion elicitation. So, the very first stimulus that comes to our mind is of course the images, with respect to the images the idea is very simple what you do you present a particular type of image to a to certain set of individuals in order to evoke a particular type of feeling.

So for example, if you want the individual to experience a happy emotion you would be presenting some happy images right, images depicting happy emotions. So for example, images of a maybe of a cute baby images of a very beautiful flower and then thing so on so forth right.

So, you got the idea that the basic idea is that you are going to use image as an stimulus to provoke a particular type of emotion and what the participants has to do they simply have to

look at the screen and they simply look at have to look at the image and that is being presented and then while the image is being presented you are going to hope that the same type of emotion is being experienced by the participant that you wanted to elicit and the accordingly you would be collecting the data in the different modalities right.

So, but one thing that you have to pay attention here not only with respect to the images, but with all the stimulus that the presentation method has to be standardized. Such that the individuals all the individuals those who are participating they have the same viewing experience.

So for example, there are different researchers those who have given their comments on how to standardize this kind of viewing experience. But for example, if you look at this paper from Monkaresi and his group, then what they are saying that the images for example, could be presented for 10 seconds. So, how long the images should be presented the answer is 10 seconds on a computer screen and the computer screen should be fixed at a fixed distance.

So, you cannot just change the distance of the participant from the screen there has to be a fixed chair, there has to be a fixed monitor on which the image is being presented, the image duration should be same 10 seconds. Of course, needless to say it has to be a constant screen resolution you cannot just change the resolution of the screen, the screen brightness as well has to be constant.

You cannot just change the screen brightness from the image to image and the same goes for the image size as well. So, image size as well has to be the constant or has to be the same. Now, what particular image size, what should be the screen resolution, what should be the screen brightness that depends on so many different things.

But what is of more importance that your participant or the individual whom who is acting as a participant should be able to clearly look at the image number 1, should be able to experience the emotions that are being presented in the image without having the influence of any other variables.

So, without having the influence of the screen brightness, resolution, image size or the distance right, so this is a nice paper to look at. But more or less these are some of the standard conditions that you want to use you want to maintain while collecting the data for while presenting the image as an stimulus right.

Of course, now the next set of questions which images should I present, as I said so you want to make use of the images according to the emotions that you want to evoke. But now are there any standard set of images? So for example, or let me ask you this question now if of course I know that it is quite acceptable that if I am going to make use of an image which is of a cute baby or of a flower maybe it is going to make the individuals happy.

But is it standardized is it already well known, is it already validated, it is already established. So, the answer is yes there are certain standard images datasets such as IAPS and GAPED International Effective Picture System and Genova Affective Picture Database which is already well validated data sets of images.

What do you mean by well validated that a particular set of images have been screened for you, they have been already shown to the participants and participants have been shown to have experienced the emotions that these images wanted to provoke, these images wanted to elicit right.

So, let us just take a quick example of a of some sample pictures from the IAPS a data set. So for example, if you look at the screen now in this you have of course and there are different categories of emotions that can be elicited. So, for example, for the IAPS you have awe excitement anger sadness contentment amusement and so on and so forth.

Now, if you were to look at a particular kind of feeling so for example sadness, if you look at the sadness emotion of the sadness. Now by looking at this particular image it looks kind of a very sad image actually and when you look at the sad images of course you may experience the sad emotion as well right. So, that is what the basic idea is.

Similarly, let us say if you look at this image here which is depicting the fear emotion. So, if you look at this particular image emotion maybe the individual is feeling scared or afraid and the same emotion the participant who is going to view this image may experience the same

type of emotion and similarly it goes for the same for the awe for the containment and so on and so forth right.

So, basically this is the IAPS data set images which you can very well go and look up look for them and this is publicly available for you to download and for you to experience perfect. So, having talked about that images are one particular type of passive stimuli which can be used to present the stimulus.

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Now let us try to look at what are some of the advantages of this particular type of emotion of this particular type of stimulus. So of course, one particular advantage it is very Noninvasive of course, all the passive methods they are going to be Noninvasive right.

So, it is not intrusive and the individual does not have to put any effort. So, it is very comfortable for the participant to look at these stimulus which is these images. Of course, these are easily accessible in the sense first that there is a this data set of images which are widely validated already which is already publicly available in terms of IAPS gate pit and all and so on and so forth.

So, you can simply use them and in order to present these images as an stimulus you require a very simple setup right. So, you simply need a computer screen, you simply need to put the computer screen at a particular resolution at a particular distance and so on and so forth.

And you simply need to put the participants in a fixed chair and participants should be able to simply look at the screen and then you are going to collect the data right. So, it is really very easy to collect the data set to create a data set of the emotional expressions of by using the images as an stimuli.

Now, there are certain disadvantages of course, and I think one disadvantage that you may have observed already by looking at the images is that the strength of the emotion is lower right. So, basically the intensity with which the participant is going to experience the emotions while looking at an image may not be as high right or may not be very high.

In fact, it could be quite low in many cases right. So, that is why the strength of the emotion is lower of course, it is quite understood emotional reactions are short and transient. What does it mean? It simply means that even if let us say you know like I am going to watch an image and I am going to feel something that particular feeling that I am going to have.

Let us say happiness or sadness or whatever is going to be very short I am not going to be happy for a longer duration of time let us say you know I just look at an image and now I am sad for 10 minutes that is not going to be the case. So, it is going to be very short duration may be couple of seconds few seconds only maybe and then of course, this is going to be very transient right.

So, in that sense the you will have a very short time window in which you can really capture the expression of that emotion through different modalities right. So, that is what essentially it means and hence this is another disadvantage, of course the third that there is a lack of personal personalization. What do you mean by there is a lack of personalization? Of course, apart from the fact that different individuals may experience different emotions by observing while looking at the same image right.

So for example, maybe you are presenting a picture of a let us say a dog a cute puppy right, but maybe you know someone's puppy recently died maybe and for the same reason while looking at that particular image while one individual may feel happy, then another individual may start feeling sad.

So of course, there is a lack of personalization here if you are thinking that the same image is going to induce the same set of emotions among different participants. Apart from this there are different studies which have shown that the personalization can be done at the various level.

So for example, this is very interesting study from the Asensio and his group pointed out that the individuals with cocaine addiction they react differently to the pleasant, unpleasant and the neutral IAPS images in comparison with the control population. So, here you have another way in which you see that the individuals preconditions including their addition including their medical history maybe and so on and so forth.

And including their biases and prejudices also can play a role in the their experience of the emotion. Now so this is just one thing right and then the there is a reason why I put this etcetera term here because, of course there are different other several other types of disadvantages that can be associated with this image as an stimuli as well. But now I would like you to think some of them right perfect. So, we talked about the advantages we talked about the disadvantages of the emotions.

Now, the utilizing there is another thing that we have to understand that when you use the images for the emotion expressions, they can be very useful actually for the reactive modalities in which there is a reaction from the human. In which there is a reaction from the body such as your facial expressions you are reacting by seeing an image in your physiological signals.

So, the same type of reactions can be expressed in your physiological modalities as well, but may not be very useful when you want to collect the productive modality. So for example, let us say if you want to analyse that ok, you want to understand the emotions in the text. Now if you want to understand the emotions in the text and you are showing image as an stimuli.

Now, if you are showing an image as an stimuli it is going to be very very hard or next to impossible to collect the textual data in which the individual is going to express his or her emotional state right. So for example, it is not going to happen that you know suddenly I saw in image and maybe I will start writing that ok I am feeling very happy by looking at this image for example right.

And similarly for example, gestures while of course, the amount of gestures that one individual makes in comparison to the other individual it varies. But it is going to be very hard that you know just by looking at one particular image suddenly the individual will start making gestures right.

So, now, you got the idea that why this type of passive method of image of using image as an stimulus of image as a stimulus may not be very helpful for collecting the productive modalities in the data collection right perfect.

Passive Methods: Film Clips

1. For comparison purposes, a neutral baseline film is generally shown prior to the presentation of each emotional clip.
   - neutral clip [12 seconds] -> emotional clip [1-2 minute] -> self-assessment phase
2. Short clips or long clips?
3. Physical situation should be standardized (Rottenberg et. al, 2007):
   - E.g. 20 inch monitor about 5 feet from the participant

So, this was all about the images now of course, the next thing that we can ask the next question that we can ask if we can use image as an stimulus can we use film clips, a video clips as an stimulus the answer is yes. If we can use the video clips also as a stimulus, the basic idea is the same we have to follow some standardization and the idea here is more or less, the same as the idea of the images is that first what we do that we present a neutral baseline film.

A neutral baseline film means of course everyone's new baseline emotional state can be different. Hence even before start collecting the actual emotional expressions you may want to first show a neutral film which is not necessarily evoking any particular emotion. It is a neutral film maybe you are just talking about some documentary talking about general stuff and so you want to put the participant in a particular neutral state of emotion.

And then after that you want to maybe be present one particular emotion clip related to let us say you want to make the individual happy, then maybe after making the individual happy or sad or whatever then maybe you want to do some sort of self-assessment in order to ask that ok. What exactly was the emotion? For example, that you felt while using this thing and similarly so on and so forth.

You can simply go on putting one emotional clip one self-assessment another emotional clip another self-assessment and so on and so forth. Please pay attention self-assessment is just one type of ground truth that you can collect from the participants right. Of course, while the individual is watching the clip you may want to collect and you have to keep collecting the data of the audio visual modalities using a webcam or a camera.

Similarly, if you are interested in the physiological signals you may have attached already the sensors which are already collecting the physiological signals, while the individual is watching the video clip and so on and so forth right. So, and of course, once the emotional clip presentation is done, then the self-assessment phase is there where you are asking the participant to provide the basic ground truth that how exactly. So, the questions can be very simple.

So, for example, I showed you an image video and then I asked ok how do you feel after seeing the video is as simple as that right. Now having said that so it is very simple, of course all the standardization conditions are more or less as we saw in the case of the images it has to be the more or less the same.

Now, there are couple of questions that we may want to answer, first should we make use of the short clips or the long clips. Now of course, there is a trade-off here right. So, if you make use of a very short clip, then what is going to happen this particular video clip stimulus is going to start behaving like an image.

So, these emotions are going to be short transient, the intensity of the emotions may not be as high as you want it to be right. But then if you make use of a very long clip then also you can say that ok, for example if I show you a one hour long video and then I ask how did you feel.

Now, that is a very complex answer because over the period of 1 hour I may have felt n different emotions and then you cannot really say that at what particular point of time I was experiencing what particular emotion right. So, then there has to be a trade-off and as I said so for example, usually in the research in the literature a clip of 1 to 2 minutes have been used fairly widely and that is what is the trade-off that is there between the video shot and the long clips so1 to 2 is quite good.

Of course as I said physical situation as we are standardizing with respect to the images has to be standardized for the video clips as well. And so for example, Rottenberg shows and his team shows in a paper that for example it could be a 20 inch monitor at approximately at 5 feet from the participant of course, with a constant screen resolution, constant duration more or less constant duration.

Of course, while there could be video clips which can be one video clip could be of another 1 duration another video clip, let us say you know 1 video clip let us say if you are talking about 2 video clips. So, 1 video clip could be of I do not know let us say 60 seconds another video clip could be 63 seconds. So, this is perfectly fine there is no problem in that perfect.

Passive Methods: Film Clips

1. For comparison purposes, a neutral baseline film is generally shown prior to the presentation of each emotional clip.
   - neutral clip [12 seconds] -> emotional clip [1-2 minute] -> self-assessment phase
2. Short clips or long clips?
3. Physical situation should be standardized (Rottenberg et. al, 2007):
   - E.g. 20 inch monitor about 5 feet from the participant
4. For each target emotion, 1 to 2 short clips as homogenous as possible
5. The flims can be selected online from various sources, e.g:
   - https://sites.uclouvain.be/ipsp/FilmStim/

So, now let me just quickly rub this thing in order to make it clear, for each target emotion the basic strategies that you may want to present rather than just 1 maybe 1 to 2 short clips and of course, these 2 short clips should be as homogeneous as possible. What do you mean by as homogeneous as possible?

More or less the duration should be the same, the intensity should be the same the context more or less should be the same, the of the of the videos the quality of the video should be more or less the same otherwise it can influence this thing right. Now, similarly the way we have some standard images data set of standard images which are already pre validated, do we have data sets of videos that are already pre validated.

Of course, no one is stopping you to create curate your own data set, but of course it is always good to look at the what if there is something existing if there is existing you can use that

otherwise of course feel free to go. So for example, do we do have. So, for example, film stim is one such popular data set of video clips which is already there.

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Passive Methods: Sample

Source - https://sites.uclouvain.be/ipsp/FilmStim/En/2.mp4

And you can use one of the images from one of the videos from this thing to present a particular to use it as a stimulus. So for example, let us see I am not sure if I can play this thing here, but ok. So, you can just go ahead and look at. So, for example, this is the sample video clip from this film stim.

So, this if you recall this is the very famous clip from the movie I believe is from the Schindler list and if you recall so what happens basically in this clip that this particular individual you know was looking at some the migrants and some workers and he I believe he shots one of the one of the one of the children that were there. And so I think that was very sad kind of a clip.

So, you look at this clip and you feel a very sad emotion you feel a bit angry as well you feel disappointed as well. So, there are lots of emotions that you experience while looking at this particular type of video clips. So, as you can see so the duration of this thing is of course between 1 to 2 minutes, which is 1 minute 38 seconds exactly to be precise in this case.

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Now having talked about the sample, now let us quickly look at sorry let us quickly look at you know what are some of the advantages of the video clips over the images when we are using them as a stimulus. Of course, they capture the attention very well it is needless to say that you know you will pay more attention while looking at an video clip, rather than while looking at an image fairly easy.

If you look at the intensity of the emotions there has been n number of research which shows that the intensity of the emotions for the video clips are bit higher and could be quite for the

video clips. And at the same time you can even make use of some you can even induce complex emotional states such as let us say shame, guilt and all those kind of emotions which otherwise would be very very hard to you know induce while using the images as an stimulus right.

And of course, as I said for the images there was another problem that since it were the emotions that were being expressed were short and transient. So, you could not really study the let us say the what is the emotional latency. So, what do you mean by the latency?

Emotional latency means that after having presented the stimulus how much time it took for the individual to express or experience those emotions. So for example, maybe you presented an image you presented a video clip and after exactly 200 milliseconds the individual process it took 200 milliseconds for the individual to process it and within 200 milliseconds the expression or the experience of that emotion is started appearing in the facial expressions in the brain signals and so on so forth. So, that is the emotion latency.

So, since the emotions they last longer now you can study what is the latency of a particular emotion in a particular modality. What is the rise time? Of course, how much time it takes for the emotion to reach at a peak, because of course you have a longer duration emotions.

So, you can really analyse that ok how the emotions are arousing and when they are appearing at a peak and then when they are going down. Similarly what was the total duration and what was the offset time between the it is more or less similar to the latency between the presentation of an stimulus and the experience of the emotion right.

Of course then associated with the advantages then you also have some disadvantages. For example, ecological validity of course, it can be in question. So, maybe you want to induce a positive emotion by presenting a positive clip, but maybe the individual is feeling sad for so many reason, maybe there is a lack of personalization maybe because of the prejudices because of the bias and so on and so forth.

So, the ecological validity it may be in question, of course to avoid this what we try to do we try to make use of the data sets which are already pre validated such as film stim and so on and so forth. Other of course, you have to take into account this factor that the individuals may have seen the video clips before.

So for example, the Schindler's list if the same movie someone has already seen this movie maybe the individual is not going to feel or experience the emotion in the same way while looking at this clip in comparison to someone who has never seen the movie or the clip. Because, of course they already know what is going to happen what is about to happen? So you have to take all these factors into account.

Now of course, again here since it is a passive modality again it is not ideal for collecting the data from the productive modalities such as text, suddenly I am not going to start writing you know while looking at the video clip that ok how I am feeling, I am not going to you know make start making gestures that are accordance to the emotions that I am feeling right.

So, that is what the other thing about the this video clips. So, with that now so we talked about the images and the film stim.

Active Methods:Behavioral Manipulation

1. Individuals are instructed to adopt particular muscular configurations or behavioral patterns that have been associated with emotional expressions, such as contracting or relaxing facial muscles or exaggerating natural emotional expressions (Ekman et. al, 1993, 2007).

2. Directed Facial Action Task (Ekman et. al, 2007)
   a. Method for eliciting emotion through the manipulation of facial expressions

3. Researchers often ask participants to think or write about an instance(s) from their past when they experienced an emotion such as anger (e.g., Siedlecka et al., 2015).
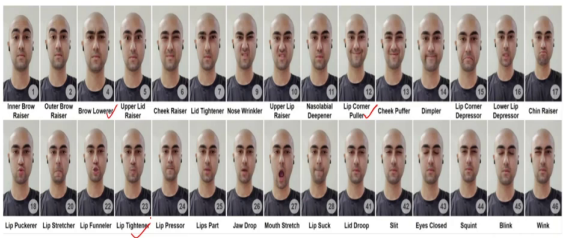
Now let us move to the Behavioural Manipulation. So now, that we have already seen the image and the film clips as the stimulus passive methods, emotion elicitation method way now let us look at the Active Methods. So, in the active methods the behavioural manipulation is one very popular method in which you ask the participants or the participants are being asked to put their themselves in a particular behavioural pattern, behavioural configuration in order to invoke evoke a particular type of emotion right.

And there was one of Ekman was one of the first researchers who did a lot of work extensively on the facial muscles in general and trying to understand that how putting yourself in one particular type of facial configuration can also evoke a particular type of emotion or the desired emotion that you want the participant to experience. And in relation to this only he proposed something which is known as a directed facial action task.

So, in the directed facial action task what Paul Ekman proposed that you can ask the participants to create or mimic a particular type of action unit. So, by action units what we mean by? For example this is the deleted facial action task.
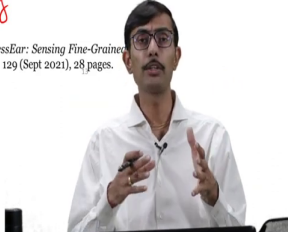
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So, for example, you can ask the participant to put himself or herself in a particular type of action unit. So for example, action unit 12 is the lip corner puller. So, you can ask the participant to mimic the facial action unit 12 which is the lip corner puller and while putting experiencing while putting the participant in this particular configuration facial configuration. The participant will experience the emotion that is associated with this facial action unit.

So for example, there is a there are lots of research which says Paul Ekman's group himself has given that what particular type of facial action units are associated with which type of emotion. So for example, if I were to ask here that facial action unit with this is the facial

action unit is the lip corner puller, then what is the type of the emotion that you think will it be associated with it.

Of course the answer would be that it is could be a happy or joyful full kind of a position right, because you are putting forcing your face to do a mimic a smile. So, this is what is the facial action task, in which the you can ask the participant to do the manipulation of the facial expressions through which the desired emotion can be evoked that is one type of behavioural manipulation.

Other type of behavioural manipulation which is also again not so uncommon in the affective computing research which is known as the Recall method. So, in the recall method you may have experienced that when you ask the participant or when you yourself try to recall the experiences of the past, then you tend to feel that particular emotion as well.

So for example, in the past if in a moment I have felt a particular happy emotion, while let us say visiting a particular place then if I start recollecting the memories of that particular place I will again start experiencing the happy emotion that is associated with it right. So, that is the recall manipulation recall behavioural manipulation.

So, we already looked at the one example of the facial action task. So for example, this was a work that was done by our group only, in which we showed that how can you use how can you use the directed facial action task to identify, what are the different how the different facial expressions can be recognized with the help of the earable device that the individual is putting in his ear, while making a particular facial expression.

So, for the interested readers I would like to invite them to please go ahead and read the paper, in order to know the more details how earable device can be used to recognize the facial emotions that is associated with the facial action task perfect.

Active Methods:Behavioral Manipulation

1. Disadvantages:
   a. Ecological validity: Can one really say that the emotions elicited through behavioural manipulation are more "pure"?
   b. One needs to know the physical behaviour associated with target emotions.
      i. Ekman's work does not include more complex emotions such as frustration, confusion, engagement etc.
      ii. Limits the range of target emotions
   c. Poses or actions required can be difficult or complicated.
2. Advantages:
   a. Useful for collecting reactive expressions
   b. The effects are strong if physical behaviour associated with target emotions are known precisely.

That is one of the advantages, but then of course there are certain disadvantages associated with the behavioural manipulation. So for example, one advantage one disadvantage that is there is the ecological validity of the data itself can be in question here. Of course, while I am trying to mimic a smile does it really mean that I am smiling, that is it really mean that I am happy. So, that is where is the question that can be asked that are my emotions pure, when I am trying to mimic a particular emotion.

So, again this is the same question that we had asked in the beginning as well. So, the ecological validity of course is in question. Other question that we want to ask is that in order to use the behavioural manipulation to evoke a particular emotion we need to know the physical behaviour associated with all the target emotions right. So, for example, Paul

Ekman's group his work itself did not include several complex emotions such as frustration, confusion, engagement.

So, Paul Ekman and his in his work did not very clearly distinguish how when a individual is experiencing frustration or confusion or engagement for that matter. What are the different facial action units associated with it and how exactly it can be evoked and expressed in terms of the facial expressions? So now, with this what happens that it limits the range of the target emotions that you can really induce in a participant right.

So for example, if I really do not know that what is the gesture what is the facial expression that is associated with the frustration. I really cannot ask the participant to make that gesture to make that facial expression and hence I cannot evoke that particular emotion and in the absence of such elicitation, I cannot really understand and analyse that particular type of emotion right. So, it really limits the range of the target motions that the individual can be elicited with.

Now, third any guess what is the third disadvantage perfect. So now the third of course it can be very clear that the poses or the actions even if it is known for particular emotions can be really hard or difficult for a participant to mimic or to put himself or herself in. So for example, here only if you look at the detected facial action task, now I am pretty sure that for example in this there are certain emotions certain facial action units that could be a bit easier in comparison to something that is a bit harder.

So for example, if you look at the brow lowerer may be brow lowerer ok, even I think I can do. So, maybe brow lowerer brow lowerer is a bit is a bit easy. Now, similarly if I look if I were to look at let us say lip tightener maybe ok, I do not know if I am able to make it very clearly right. So but of course, now you saw the problem that whether I am able to do the lip tightening the way it is supposed to be.

And in similarly there are all other different types of facial action units and not only the facial action units you also have to look at the gestures associated with it, that you want your

participants to perform and maybe not all the participants would be very comfortable in performing this those and hence this pose or the actions can be very difficult or complicated.

Of course in comparison maybe you can get the recall experiences can be a better, that you can get the get the participants recall some of the experiences that they had in the past and can hopefully it will evoke a particular desired emotion in them. And advantages we already talked about that it is really useful in collecting the reactive expressions, such as the emotions as it is being expressed in the facial expressions or in the gestures.

Now, other thing that you have to understand that the intensity of the motion can be really strong, if we can ensure the ecological validity of it. How can we ensure the ecological validity of it? Of course, in order to do that we really need to understand the physical behaviour associated with the target emotions have to be known precisely right.

So for example of course we know that when you want when you are happy when you are experiencing joy. Then of course, maybe you are smiling when you are smiling then of course, you cannot really smile without you know having your having pulled your lips right. So, maybe you are pulling your lips. So, this is the precise information that is available for happy and corresponding facial action units and corresponding facial muscles configuration.

So, maybe you can expect here that ok if the individual is mimicking this particular type of smile through this body brain effect that we studied earlier, we can very well expect the individual to start feeling or experience experiencing this particular type of happy emotion. So, in this case the intensity of the emotions can be a bit stronger, than for example in comparison to the images or the images as a passive method stimulation right perfect.
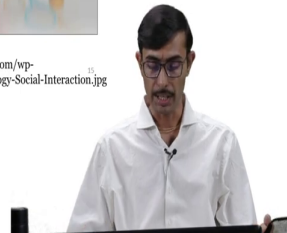
Active Methods: Social Interaction

- Advantages:
  a. Elicited emotions are more realistic and natural.
  b. Easy to elicit emotions that are otherwise hard to elicit, such as anger, guilt.

Source: https://brewminate.com/wp-content/uploads/2018/02/022818-122-Sociology-Social-Interaction.jpg

So, that is the one that is not the only active method behavioural manipulation is not the only method for the active emotion elicitation, one other method which is not again very uncommon is the Social Interaction. So, basically social interaction what do we mean by the social interaction?

Of course, social interaction is basically when you are interacting in a society with the society in general with the individuals, with the groups and with the community. Now the idea is very very simple that while you are interacting with the society, in general of course there cannot be an absence of the emotions right.

So, whenever you are interacting with the other individuals whether, whenever you are interacting with the groups, whenever you are interacting with the community, with your relatives, with your friends. Of course, there are certain emotions that are bound to occur that

are bound to happen. So, basically this is a very naturalistic setting in which the emotions are being evoked and the emotions are being expressed right.

And hence, so the one of the advantages of course it is that the elicited emotions are very realistic and are very natural provided that you can really capture them right. So, please recall that we did talk about in the beginning that capturing of the emotions in such a setting can be really difficult.

So, you cannot just take out your camera and start clicking the pictures of the people those who are for example happily interacting in the park right. Of course, there are privacy concerns and on the top of that imagine if you want to understand their brain signals. So, are you going to really put a sensor immediately on their head when you saw them laughing in the park that you cannot do right.

So, the there is a disadvantage associated with it that the data collection setup can be really difficult it is not easy to collect the data. But of course, the emotions they can be very realistic and natural. Other very interesting thing with this particular type of setting which is a social interaction setting, is that there are certain emotions that are really hard to evoke when you are using the passive methods.

Such as images or even for that matter behavioural manipulation or for that matter video clips or along the same lines we can all we could have also talked about the audio which is the music. But nevertheless I think now you got the idea that audio, images, video clips they all are fall in the same category of the passive methods of the emotion elicitation.

But now there are certain emotions which are a bit complex and may be a bit harder to induce. Such as for example guilt, shame, again anger, may be to certain extent right these are certain emotions that are bit complex and you cannot really just present a particular image present a particular video clip, maybe make them listen to some music and you start individually experiencing experience some guilt, some shame.

So, but in the social interaction this is fairly easy. So, I think it is fairly common experience that you may have also been when you know your relatives your friends, they have said something and you have immediately you know started feeling guilty about that.

For example you may not have been able to give them enough time or for example maybe you started feeling ashamed about certain things; that you may or may not have done. But have been it is now being talked about in the social gathering in the social interaction right.

So, in short we talked about the social interaction as the active emotion elicitation, we talked about the behavioural manipulation as a active method of manipulation, we talked about the video clips, we talked about the images at the passive method of emotion elicitation.

And as I said along these lines you can very well include the music the audio, of course it is not hard to believe understand that it falls into the passive category of the emotional elicitation, advantages disadvantages. I invite the interested audience to look at and explore what could be the advantages of using the music as a stimulus, using the audio as a stimulus and what could be some of the disadvantages associated with the music as an stimulus perfect.

So, with that then we finish this particular module of the emotion elicitation and in the next module now we will be talking about the Experimental Methodology. So, with that let us take a break.

Thanks.