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### STUDY OF IMPACT OF PERSONALISING ON DECISION MAKING.

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**Abstract:** Cognitive capability of any individual is the precise sensing of the situation and generating the optimized and ranked case specific database to be match with given situation [1,2,3]. It implies that enhancing the cognitive capability is possible only after enhancing the sensing capabilities of individual. Paper presented few classes of reasons to optimize the sensing limits of individuals below 14 years of age. Authors studied 117 sensing parameters of individuals, using which they sense real life situation. Parameters are divided into three categories e.g. Measured Parameters: sensory organ specific parameters for each sense, Scaling: situation specific importance of measured parameters and Grammar: situation specific interpretation of the measured and scaling parameters. 386 volunteers were involved into study, the gender, age and other demographic factors were not presented in this paper as the focus of paper is on personalising the decision making. Age, gender and other person specific characterises affects the measurement and scaling of sensory parameter thereby the decisions, it means biasness due to these factors is automatically taken into account. The specific studies for gender, age etc. is considered as beyond the scope of the paper.

**Keywords:** Cognitive Capability, Decision Making, Personalising Decision Making



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## INTRODUCTION

### Methodology:

#### Sensing Parameter Identification:

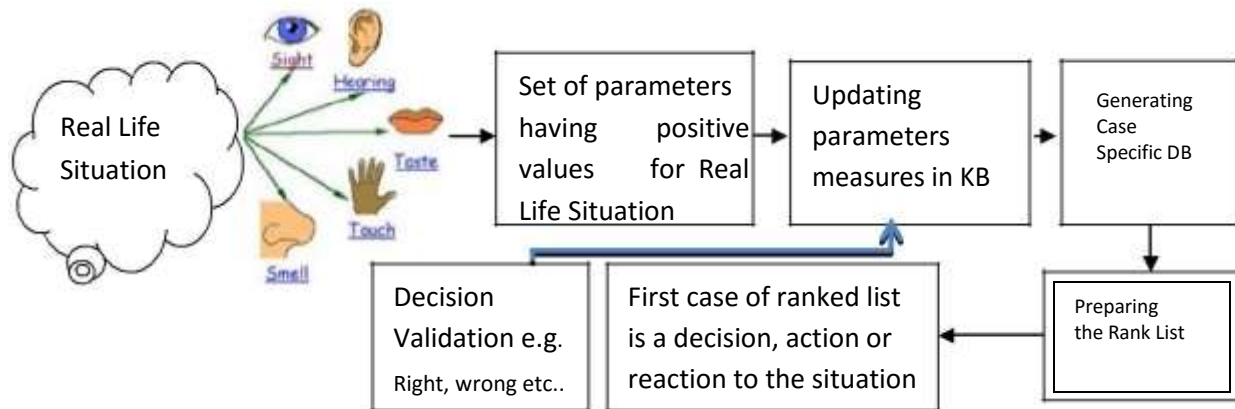
Authors have carried out experiments and extensive review of relevant articles into cognitive domain to identify the parameters that are being measured when individuals are presented to different situations. Experiments were designed for the different senses and the information received by the senses is modelled into parameters.

#### Parameter Classification

The sensory parameters are divided into three different categories.

- 1. Measured Parameters:** The measured parameter category include the values that are received by sensory system, when individuals are presented to the situation. The situation specific reading of parameters are used to create the knowledge base. The measured parameters values used to generate the situation code (SC: set of all values measured by sensory system). The SC set is updated into knowledge bases which is use for generating the Case Specific Database (CSD) while taking any decisions.

The sensing cycle with respect to the parameters measurement is shown in figure 1.



**Figure 1: Situation sensing mechanism and cognitive system**

The sensory system measures the situation in terms of the parameter readings of different applicable senses used to sense the situation. E.g. single sense and its parameters or combination of two or more senses and their parameters. Parameters here mean the parameters which are having positive values and required to sense the situation.

### Calculating the range of parameters

To understand the normal and abnormal reading the standard range of various parameters was established by adding and subtracting the standard deviation to the statistical mean value of respective parameters. The resulted interval is used as the range for each parameter applicable in given situation.

#### Logic used:

If the values are within the range obtained using standard deviation, it is considered as normal, else it is considered as abnormal. The normal and abnormal results are passed to interpretation engine which applied the grammar rules and decides about the knowledge base update.

#### Generating CSD

The range will be matched with KB to generate list of records having values between the current ranges of each applicable parameters. The list so obtained will be the case specific databases. The CSD will be ranked as per most matching to least matching records. Generally first record will be solution e.g. action, reaction, decision etc. to given situation.

2. **Scaling Parameters:** The scaling parameters decide the weight in given situation and contribution in decision making of each parameter. The scaling parameters are multiplied with measured parameters to obtain the situation code to measure importance of situation e.g. urgent, immediate action, no action, response type etc.
3. **Grammar:** The grammar helps to interpret situation code and parameter values (measures and scaling) in given situation.

#### Parameter Classification:

**Table 1 below represents the classification of senses parameters into different categories**

SN	Sense	Parameters		
		Measured	Scaling	Grammar
1.	Vision	5	6	
2.	Smell	7	3	
3.	Taste	7	3	62
4.	Touch	6	3	
5.	Hearing	12	3	
	<b>Total:</b>	37	18	
		<b>Total of all categories</b>		117

**Table 1. Classification of senses parameters**

### Experiments:

The simulation based experiments were carried out with the help of animations tools, physical objects (Natural or artificial). Primary information like personal choice, budget, preferences etc. studied before giving the experiment to the volunteers. The collected information was used to create the personalised situation for repeating the experiments in personalised situation in second step.

#### Experiment no 1: Mango purchase decision.

Step 1: Mango picture with 3D rotation animations and artificial mango were shown to the volunteers. They were not allowed to touch then they were asked if they are willing to purchase the mango.

Step 2: Same mango picture displayed personalised attributes depending on the case like price, type, taste and allowing to touch the artificial mango. They were again asked if they are willing to purchase the mango.

#### Experiment 2:

##### Explanation

The precision of which is depended on the accuracy of the measured values and situation specific calculation of scaling and grammar. Examples assume a situation where we have to decide which one is a real fruit, (to say a plastic mango fruit and a real mango fruit). The first parameter to differentiate will be by seeing both mango (Visual perception). Then the data received as SC will generate the positive value in KB based on visual values to differentiate between two mangos. Now on the basis of SC and KB, CSD will be generated (To say if the shape and Colour of the mango matches the data in KB) which will measure the value of each parameter to differentiate between the two mangoes. Then other parameter to differentiate will be smell of the fruit, texture of the fruit. In this manner for each parameter a value will be given to choose between two mangoes (to say if the smell of the mango matches the smell value in KB). According to this a rank list will be generated which will be the values of each parameter to choose real mango between the two mangoes. Now the highly ranked (the maximum feature of the real mango) in CSD matches the value in the KB for each parameter then only choice of real mango will be made. Its means that the values of each parameter in KB should matches the highest ranked value of each parameter in CSD for solution of real like situation (In this case Decision to choose real mango between the two mango).

**Enhancing the Cognitive Ability**

**Step in cognitive development**

Now it is clear that for enhancing the cognitive ability is dependent on enhancing the reception of the five senses in terms of the measured values. Secondly the appropriate scale of the situation is also very important for getting close to the desired solution in given situation. It means for improving the cognitive ability we need to optimize the sensing limits of individuals. The senses optimization includes following steps.

**Optimization of biological sensing limits**

**Optimization of biological limit utilization**

**Cognitive architecture setting**

**Ethical and logical boundaries setting**

**Validation, Adaptation and Person Specific characteristic.**

The steps mentioned above are having the dependency on the biological age of the individuals. The step should correspond to the suitable biological age of the individuals. It is challenging to develop the cognitive ability of any individual without mapping the development steps to the corresponding development mile stone. Authors have noticed that, cognitive ability development process in completed in first 14 years of individuals of life irrespective of gender, race, lifestyle and geography. However there may be a deviation of 13-14% milestone due to various individual specific and biological factors. The discussion of factors affecting milestone is beyond the scope of this paper [8, 9, and 10].



**Figure 2 Mapping of biological milestone to cognitive capability development process**

## Possible Enhancement

### 1. Pregnancy – (Biological Sensing Limit Enhancement)

3rd week of pregnancy to 34th week of pregnancy is the best time to improve biological limit of the reception of five senses. We have identified the technique to enhance the biological development of sensing architecture to be followed by pregnant women during the pregnancy at the specified period due to time dependency. We wish to now perform the clinical validation of outcome

### 2. After Birth

After the birth there are four mile stone of cognitive capability improvement. These milestones are as follows.

#### a. 0 to 3 Years (Logical Limit and Senses Biological Capacity Utilization Enhancement)

This is important phase in view of setting up the minimum receivable and maximum tolerance of individuals. It depended on the biological limits developed during the pregnancy. During this phase baby adapts the senses limits to suit the biological limits. It is important to allow the cognitive system development in unsupervised manner and adaptive manner as per surroundings, not by supervising the kids. But most parents end up with over protecting the kids during this phase which results in underutilization of senses capacity. Putting restricting or stopping kids doing something means we are putting the manual limits of their ability to receive the data. Such manual limits mostly mismatch with the actual biological limits. Then it changes the interpretation and perception of the data. Means we are putting the kids on the wrong path at very beginning. It is capable to spoil the entire cognitive capability development process unknowingly. (This why in Indian scenario almost 90% adults do not enjoy the job they do as result of the mismatch.) But those who are able to match or correct it before the age of 14 year they will become extraordinary in their fields of choice. Supervising the cognitive development in 0 to 3 years of age is most common mistake done by more than 90% parents. It can be corrected only till the age of 6 years. So the major responsibility lies on parents and people surrounding the child.

#### b. 3 to 6 Years (Cognitive Architecture Setting )

This module is under development, the proposed system will develop the cognitive architecture of kids in line with our finding. Each kid will be assessed and personalized cognitive architecture development path will be designed.

**c. 6 to 9 Years (Ethical and Social Limit Setting Based of Data Acquired)**

This is the again important milestone of cognitive ability development process. Here we need to set the ethical boundaries for the data acquired during first phase (0 to 3 Years) and for the data that will be acquire till the age of 16 years. Means we need to have the all ethical, legal and common sense, restriction implemented and executed. It helps them to distinguish the good and bad, make them alert, develop their common sense, their decision making, presence of mind, love, affections and other personality traits.

Our system is equipped with the predefined experiments and validated algorithms. On top of this we are having team of scientist who are monitoring the development of kids.

**d. 9 to 14 Years (Personality traits development and validation phase)**

This phase can be referred as the validation and correction phase. During this phase children are need to be given supervise learning. The learning “must be” by doing not theory. They need to be exposed to all good and bad things under strict supervision. But supervision must of advisory nature not of restricting type. Children should be allowed to take their decision. The outcomes of their decision must be explained to them (irrespective of good or bad). The necessary correction need to be advice to them so as to go closer to the acceptable and good decisions. This the final stage after which the complete system will be ready to take on the real life challenges.

**CONCLUSION:**

The review study presented in this paper therefore conclude that for optimizing the human cognitive ability , the precision of the data received by the five senses is important to have enhanced cognitive ability. If all 117 parameter will be measured to the precise value in term of real life situation then cognitive capability can be optimized to the maximum limit. Its means that if the ability of the five senses are optimized to their maximum sensing limits then cognitive ability itself will get optimized. The optimization of sense starts right from the 3rd week of pregnancy to 34th week of pregnancy and continues up to 14 years of age. After 14 years of age the enhancement of the sense to its maximum sensing limit is not possible due to the biological limit of the senses and the brain itself. The optimization of the five senses is an age based process which needs to be enhanced at the right time of age. To optimize the cognitive ability the milestone are set because the possibilities of enhancing each sense to its maximum sensing limit is possible during that point of development only. After that developmental age it is very difficult to enhance the sense limit to the maximum ability due to

the biological limit of the sense organ itself. Therefore, it is clear that to enhance the cognitive ability of the human, the optimization of the sense organ should start from the pregnancy till 14 years of age.

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