SCARF Education Model and Happiness Index Modelling

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Abstract. SCARF model has been proposed and widely adopted in most traditional classroom teaching for decades. SCARF essentially focus on Status, Certainty, Autonomy, Relatedness and Fairness, in neuroscience, which constitute to developing the character of a child in city living. However, this paper studies about the alternative education model in Heibe, China. It is found that those children lack of family supports, especially siblings (due to the one-child policy in China in the past years); and the neighbours live far apart. Hence, most of those children grow up in isolated environment. By tracing these the brought-up of those children, who attended a voluntary school where the author has taught for some years, it is noticed that those children appear to be happier in general, compared to those who did not go to such school. Hence it is pondering on the importance of social life which can be provided by attending the lessons in the voluntary school. In this paper, the authors propose extending the SCARF model to SSCARF where the prefix S symbolizing the social life that is in provision in the voluntary school. It is believed that the social aspect is a very important part of a child’s brought up. The hypothesis of SSCARF especially the social “S” is backed and verified by happiness index modelling via data mining. The results show that happiness is more related to the social aspects of the children’s childhood than material wealth.

1. Introduction
SCARF model has been around for 10 years by David Rock [1]. The original essence of the model is to guide education in such a way that children should be cultivated respective to the five fields: Status, Certainty, Autonomy, Relatedness and Fairness. The model was originally designed as a holistic model, as there are essential several aspects of childhood development that is essentially centered on and around these few aspects. These aspects do play an important role in childhood developments. For example, the Status is about relative importance to others, a child has to grow up in a righteous environment where every child shall be treated equally in youth education, cultivating their self-esteem and confidence, making them feel valued and important. Certainty concerns being able to predict the future. For example, a child shall be assured to be loved and he/she feels that he would have another good day coming tomorrow. Autonomy provides a sense of control over events. In this aspect, a child is being trusted and respected that he/she is empowered and entrusted to do things he/she wishes to do, as long as they are deemed suitable and legal. Relatedness is a sense of safety with others - of friend rather than foe. A safe environment in school and probably outside is needed for a proper grow-up. Such that he/she can relate to others developing empathy and compassion. Fairness is a perception of fair exchanges between people. In this regard, students are expected to be treated equally without bias.
As quoted by Sarah Blunt who is a Careers Adviser at The University of Birmingham [3], the SCARF model is an important aspect that contributes to helping stressed students. That is a holistic model, that shall never be missing of any one particular aspect. The traditional education nowadays often tries to base on this education for tailoring the curriculum in such a way that the five aspects are well covered.

The SCARF has been adopted widely making profound contributions to education sectors in shaping classroom and curriculums. However, the model normally fits well for urban children education. Having said that, most children that come from city living get benefited well by the SCARF model. The five aspects contribute well to the development of child, raising particular the areas of self-awareness and confidence which are applicable to cultivating responsible individuals in urban living. For example, regarding Status, if a student compares themselves to others in their peer group or receives negative feedback, draw their attention to incremental improvements with positive feedbacks for boosting their status. For Certainty, if a student doesn’t know what they want to do at any stage of their student life, use action plans and discuss possible situations and desirable outcomes. For Autonomy, a student feels a transition in life is involuntary, feel constraints in studies, encourage the student to see the positives in their situation, and the student identify factors they are in control of. In Relatedness, if a student feels incapable of tuning in with the environment or fear of knowing new subjects, encourage them to communicate more with their peers and to the teachers. In Fairness, if a situation feels unfair to a student or if their efforts spent is not immediately rewarding, talk to the student about why comparisons are important to them and how good things need time to come.

The SCARF model has relatively been tested less in education in mountain living. The focus of this paper is to discuss and analyze the adequacy of SCARF to mountain living education. In particular, we study the children under 12 who live in mountain areas where formal education is scarce. Those mountain children often receive education at home, or they would have to travel miles from home to a school in a nearby town as far as dozens of kilometers away. It is observed that the mountain children who attended the voluntary class at their young age seem to be happier than those who did not attend the voluntary class staying at home, isolated, most of the times.

The paper is structured as follow: Section 2 describes how the SCARF can be extended to be the one that embraces social development, called SSCARF. Case study of mountain village teaching is narrated in Section 3, as a supporting clause for justifying the SSCARF. Happiness index modeling by machine learning is presented in Section 4, again as a supporting clause for SSCARF. The results of the happiness index modeling indicate that the social part of education is very essential to the happiness of an individual when he/she grows up.

2. Proposed SSCARF Education Model

SCARF originally focus on the five aspects of humanity in neuroscience [4]: Status: Our relative importance to others; Certainty: Our being able to predict the future; Autonomy: Our sense of control over events; Relatedness: Our sense of safety with others and ability to understand them accept them; Fairness: Our perception of fair exchanges between people. From the education perspective, the five aspects of humanity cultivate a child’s character in the areas of empathy, confidence, decision-making and responsible. SCARF advocates about the different behavioural and psychological consequences associated with threat and reward. And they come in such as way - Threat leads to: reduced working memory, narrower field of view, generalising of threat, and greater pessimism. On the other hand, Reward leads to: greater cognitive resources, more insights, increased ideas for action, fewer perceptual errors and wider field of view. These elements help growing students to fuller and more complete characters while specific pedagogical techniques could be formulated and applied to the education.

In our model, it is advocated that an additional element called “Social” is important as it will enrich the existing five aspects. More empirical evidence would be required of course to validate the efficacy
of the new model. However, in this paper, the new model called SSCARF is formulated. The SSCARF is holistic and the values from one aspect channels to the other parts. For example, as shown in Figure 1, the SSCARF embraces all the five facets.

![Figure 1. SSCARF model of social threats and rewards embraced with a social cushion.](image)

The social element helps them in the following way which are inspired by [5]:

**Status:**
In school, a student’s status is determined relative to others around them. It can be increased by praise, recognition, promotion, giving responsibility and sharing important information. It can be diminished by criticism, failure and exclusion from meetings or conversations. It can also be diminished by the successes of peer students with whom the individual does not enjoy a good relationship.

When a student’s status is threatened by being left out it activates the parts of the brain involved in the perception of physical pain. Clearly, teachers will only avoid triggering the threat response if they pay attention to maintaining each student’s status in ways that are constructive for the whole class. Bear in mind, individuals who feel their status is threatened may start indulging in behaviour that undermines their peer students, thereby rebuilding their perception of their own status. Social support can increase the status of every student in class if regularly positive feedback is offered. Not only good feedback is to be offered by teacher alone, but it should be cultivated as a culture in class; each student is learnt to praise others and offer mental supports when a student fails.

**Certainty:**
Nobody can actually predict the future, but “the best way to predict the future is to create it” as quoted from Abraham Lincoln. This means having clear goals, strategy and plans. It is advisable to encourage the students telling and sharing among their classmates. Certainty is also created through routine. If a sharing session can be held regularly, a student can always vent out some updates, that helps building rapport on one another.

Uncertainty impairs the function of the orbital frontal cortex and takes attention away from the current goal. Uncertainty reduced productivity but sharing helps reviving them up via social supports. In nowadays fast-changing environment, it’s very easy for people to begin to feel uncertain about the future, so this is an area where teachers can help not only via individual consultation session but cultivate social group discussion about future and reinforce certainty for each student in class as a whole group.

**Autonomy:**
Not every student has complete autonomy in school so what is important here is the perception of having control over events. It’s also worth noting that studying as part of a smaller team of a class significantly reduces the perception of autonomy and can raise stress levels quite dramatically. Research shows a clear correlation between a person’s health and their perception of autonomy. Wherever possible, give individual student discretion at the point of decision-making. Define areas
where each student’s own judgement is required. Nothing undermines that sense of autonomy faster than having to refer every decision to their teacher. Therefore, cultivating group discussion and small size team-oriented problem solving or social event is important. Socially, individual students take charge of completing some tasks, and some groups collaborate and work together but yet with certain autonomy in doing some assignments. Autonomy and social rapports shall not be opposite, but be fused in team-building, given the students chances and opportunities to take charge of their own decision, actions and being transparently share their progress and results among other students.

Relatedness:
In school, the idea of relatedness means a sense of safety with others and the need for safe human contact is a primary driver similar to the need for food. The sense of relatedness is easily lost when meeting new people, learning new things or when someone you know excludes you from a meeting or discussion or chooses not to confide in you over an important matter.

To avoid triggering the threat response in class, as a teacher it’s important not only for them to feel safe with each other, but also with the teacher as their leader. Fortunately, this sense of safety is easy to generate. It comes from creating rapport as advocated by NLP Practitioners, which can be done verbally or non-verbally. Shaking hands, using a person’s name, chatting about interests are common ways of creating rapport. Deeper levels of rapport can be achieved through high quality attention and matching patterns of language and behaviour.

In class, groups of students who know each other well enjoy a strong sense of relatedness and this can significantly enhance performance by triggering the ‘reward’ response that makes good use of cognitive abilities. As a teacher, it is important to create a greater sense of relatedness via social interactions – to the teacher – in the class among the students’ peers through coaching and mentoring and one-to-one meetings.

Fairness:
In class, fairness – or its absence - is noticed in many different ways. Is there a ‘fair exchange’ between individual students, between teacher and students, between team and group, between one class and another class? If something seems unfair, it rapidly triggers intense emotions and the ‘threat’ response. It uses up a lot of mental energy and distracts from everything else.

Each individual student has their own view of what is fair, but most people are also opening to seeing a different version of fairness if it can be explained fully. The NLP concept of perceptual positions and techniques such as the Meta-Mirror are applicable.

As a teacher, it’s worth taking time to explain contentious decisions and processes that seem unfair. Through talking and explanation, the students are taken through the issues and the thought process which does not only restore their sense of fairness, but also increase their status and feeling of relatedness at the same time, triggering a powerful ‘reward’ response in the face of what could have been seen as a threatening situation. These reactions are hard-wired into the brain and are not the result of conscious choices. An emotionally intelligent, self-aware student will have some capacity to suppress or manage the ‘threat’ response and generate their own ‘reward’ state. But it is not easy that a teacher can count on every child in the class having that level of emotional intelligence and self-awareness. So by the SSCARF model, it is a part of the responsibility as a teacher to create the conditions where it’s easy for each person to perform at their best. The best option is the social interactive sharing group sessions. Time shall be taken to explain and repeat about the concept of fairness, and to spend time ironing out any issue that was once thought to be unfair. Open sharing and transparent handling in social sharing session indeed will bring positive emotions.

As described up, the social parts in SSCARF are ubiquitous as that should be absorbed in the daily life of a person, both in classroom and beyond the social effect is profound as it uplifts the interpersonal skills which the mountain children are lack of.

3. Experiences of Mountain Village Teaching
In year 2010, the author had participated a voluntary teaching program in the school Heibe Charity School (HCS) as a sessional relief teacher for a period of 14 months. The class size was about 9 in a class, with several classes totally about 40 students in year grade. The demographics of the children are mainly from the nearby mountain areas. Some live from the school as far away as 10 kilometers that have to be reached on foot or primitive transport. One important point worth noting is that most of these children come from lonely family. Having said that, their background is different from other normal family. The parents would have to travel far to cities and work. Most of the time, they are away from the family. Due to the secluded living environment, those children often would have to stay at home most of the time, either alone or with their grandparents. They lack social peers interacting and spending time with them in their childhood. This social problem is well known as it affects many young children in Heibe, China. Instead of staying almost alone at home, an alternative is to attend a school such as HSC where the children can mingle with other peers in classroom who are of similar ages.

Therefore, this situation provides a case for comparing the effects of SSCARF and SCARF, depending on whether the children would have the opportunity of attending the HSC school or staying at home. The syllabus of the course and teaching styles are uniquely different from the traditional classroom learning. Since it is not a official school which is unable to confer degree or government recognized certificate, the school has the flexibility of customizing the syllabus according to the actual needs. It is deemed that the young students mostly want family warmth and supports from other peers, because their parents are away most of the times. The classes are made to be very interactive without the traditional setting of one-to-many broadcasting kind of lecture style. Often, the syllabus does not follow any formal textbook. Instead, the children are encouraged to learn via discussion with the teachers and the peers ad-hoc in free style. It is more for encouraging them to speak out in a friendly and joyful environment, without fear, stress, judgement or even strict rules. The teaching contents are of daily life knowledge. Stories telling, history appreciation as form of tales and legends are conveyed in a causal style. Hands-on practices are mainly of handy crafts, drawing, painting, and fun games among the students in a group. Group play and opinion sharing are particularly encouraged because the teaching here was not meant to be a channel of feeding technical information. But it is more for enticing their interest, learning to socialize with one another, and respecting each other, loving their peers as if loving themselves. The teachers often blend into their activities, at the same level, as a core member of the group activities without hierarchy. Each peer is treated fairly and equally. Emotional supports are provided as sometimes the students have sorrows to confide (e.g. the parents have just left home to town, and they will not be returning home for months.)

Figure 2a. Traditional classroom style.
Figure 2b. Social oriented and interactive learning style.

4. Happiness Index Modelling by Machine Learning
Happiness in this paper is broadly defined as a sense of happiness or self-feeling of happy or being happy. It is a complex part of social psychology. The extent of happiness can be influenced by many factors which are often complex. Happiness by some academic studies is known to be affected by various factors such as 1) economy factors, such as career, work inspiration, and income etc.; 2) social
factors, such as education level, social intensity, and marriage life quality, etc.; 3) psychological factors, such as cultural habits, characters, self-esteem, lifestyle, personal traits, motivations of success etc. These factors go far and deep in subtle mental levels; the factors associate in causality intertwining in high complexity.

Therefore, for simplicity, in the context of exploring the main factors for tailoring an appropriate educational model for the mountain village children, a questionnaire survey was conducted with the objective of searching for the important factors that lead to happiness. It is believed that success is important as many people are pursuing material wealth and career. However, we focus on happiness in this paper which is an essential element and reason for striving in life.

A machine learning model [6] is built, in order to infer the most important factors in life that contribute to happiness. In the raw dataset, there are a total of 38 attributes that describe an interviewee. Only 29 attributes are used in the pre-processing. The ages and the job reputations which are numeric values are binned into eight portions for aiding the machine learning model to learn more easily. Those interviewees represent the people who grow up in the similar areas and how they perceive happiness related to their personal attributes. The interviewees remain anonymous throughout the process. Their demographic details are removed, even from the induced machine learning model for ensuring no leak out of their personal details. As an ensemble learning, three machine learning algorithms are used; optionally more could be used. But the three that were adopted in this analysis are some of the most popular ones, they are: Association Rule Mining [7], Logistic Regression and Artificial Neural Network [8]. Among the three models, results that come from the most accurate model are adopted in our analysis.

In Figure 3 and Figure 4, the results which have relatively the highest accuracy are shown. The results are sorted into two groups: the feelings of being the most fortunate (happy) and the least fortunate (unhappy) from the overall aggregated results which are generated as default results.

Figure 3. Association rule mining results for feeling unhappy in economic perspective.

Figure 4. Association rule mining results for feeling happy in economic perspective.
The results in the form of association rules are ranked in descending order. With regard to feeling unhappy, pertaining to economic factors, the following attributes strongly associate with unhappiness: living with more than 5 children, having higher education for less than 7 years, jobs that are of technical, sales and administrative in nature and their reputation indications ranges from 40 to 50 (while 100 is of full mark). This implies people who have big family size (possibly overcrowded) but working in jobs that have relatively mediocre reputation.

On the other hand, the associate rule mining results pertaining to happiness, indicate that people who have the following attributes are happy: living with relatively few children (less than 3), having higher education for more than 7 years, having about five to seven siblings. These people are generally happy from economic point of view. The dependency maps that show the unhappy and happy people are shown in Figure 5 and Figure 6 respectively.

![Figure 5](dependency_chart_unhappy_economic.png)

*Figure 5. Dependency chart for feeling unhappy in economic perspective.*

![Figure 6](dependency_chart_happy_economic.png)

*Figure 6. Dependency chart for feeling happy in economic perspective.*

From psychological point of view, from the sale association rule mining results, unhappy respondents are those who are self-centered, or bankruptee, drug addicted, ignored, whose children are hospitalized and unwilling to help other people. They live an unhappy life psychologically. In contract, happy respondents from psychological point of view, have the opposite or absence of those attributes. The dependency chart for people who are feeling unhappy in psychological perspective is shown in Figure 7. The results for feeling happy are just otherwise, opposite of those attributes so they are not shown here.
It is quite apparent to have shown that people who have happy life when considering both economic and psychological factors, are those who have certain wealth, growing up in normal environment. They cherish life and avoid taking drugs, etc. The same observation is made from neural network model analysis. The neural network results indicate than more than 50% of the respondents are unhappy while they have records of drug-addiction. Likewise, spouses or family members who are hospitalized, or those who got missed out from job promotions, more than 30% the likelihood they would be unhappy. The results in attribute importance chart by neural network are shown in Figure 8. The chart is the results that come from analysis of attributes in consideration of their likelihood inclining over happy, unhappy, unimportant, or irrelevant.

Nonetheless, the artificial neural network analysis results coincide with those from association rule mining. The results from the two models with respect to economic factors coincide. Specifically, they indicate that people who have siblings between 5 and 12, living with many children, would incline to more than 35% the chance that the person would be unhappy for certain. The results by logistic regression are again in agreement with those by artificial neural network. They are shown in Figure 9.
Figure 9. Attribute importance chart by logical regression in economic perspective.

However, the results from the psychological perspective coincide with those from the other two models. Happy respondents are those who are willing to help each other, popular among their peers and not self-centered. These findings are important in relation to SSCARF model. As these essential elements are important aspects of the SSCARF, they are related to such as way, as summarized in Table 1.

Table 1. Mapping of happiness analysis to SSCARF.

| Happiness factors       | SSCARF          |
|------------------------|-----------------|
| Having few children    | Social          |
| Having few siblings    | Social          |
| Job promotion          | Fairness, status|
| Willing to help others | Relatedness, social |
| Compassion             | Relatedness, social |

5. Conclusion

The neuroscience model namely SCARF is extended to SSCARF with a strong emphasis in embracing SCARF model with social provision. A case is illustrated by the leading author whose personal experience as a voluntary teacher in the mountain area eight years ago. It was observed that the young students from mountain areas are isolated, and their parents are not at home most of the time. The school was provided not only as an academic instrument, but as an emotional shelter for these young students. Hence the proposed SSCARF makes sense because, especially in this particular case of mountain teaching, social rapport is seen to be very important in developing a whole person. SCARF has been applied successfully mainly in business environment, where office workers are to be boasted in morale by balancing well the threat-reward relations. In mountain or rural teaching SSCARF embraces the usual five elements plus the additional social rapport that is deemed very much needed in the mountain school. While it is applicable in this case study that took place in Heibe, China. It is believed that SSCARF would be applicable in other similar scenarios too in other parts of the world. At the end, a questionnaire survey asking about what makes a person happy is modelled by machine learning and analyzed. The objective is to investigate what make a person happy in relation to what or which part of education shall be provided in order to enable a happy life. The results indicate that a person who has some siblings and moderate number of children, inclusion of other economic factors e.g. stable income, job security, health, etc., make a happy life. This implies young students...
shall not be left alone, and they shall be benefited by going to school with a good sense of social rapport. This new SSCARF shall be explored further with more comprehensive questionnaire results to come, including qualitative interview. The paper reports about some quantitative results emphasizing that social life is important in SSCARF.

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