TO FIND OR NOT TO FIND:
HOW DO OPPORTUNITY IDENTIFICATION COGNITIONS DIFFER BY TASK?

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Opportunity identification is a core concept in entrepreneurship research and it is considered by many to be the most distinctive and fundamental of entrepreneurial behaviors (e.g., Gaglio, 1997; Venkataraman, 1997, Shane and Venkataraman, 2000). Opportunity identification researchers have assumed that opportunity identification is a cognitive task and cognitive explanations of opportunity identification, to date, have often focused on the suggestion that entrepreneurs have a distinctive set of perceptual and information-processing skills related to entrepreneurial alertness (Gaglio & Katz, 2001). Gaglio & Katz (2001) further apply a cognitive lens by suggesting that observed behavioral differences in opportunity identification may reflect differences in schema content and complexity between alert individuals and non-alert individuals, and propose 11 hypotheses relating to these differences. These hypotheses are not tested, leaving a significant gap in the literature.

Cognitive psychologists have identified three types of decision-making cognitions, namely analysis, quasi-rationality and heuristics. According to correspondence-accuracy principle (Hammond et al., 1987) these cognitions, or decision-making modes, would vary depending on the cognitive properties of the task, in order for a decision to be adequate. One of the most powerful moderators of a task's cognitive properties is uncertainty. According to Sarasvathy et al. (2003), based on Knight (1921), opportunities can be characterised by any level of uncertainty, starting from ultimate ("true" uncertainty by Knight (1921), which presumes opportunity creation), to moderate (opportunity discovery) to low (opportunity recognition). Thus, different levels of uncertainty during opportunity identification would induce the use analysis, quasi-rationality and intuition, respectively. Our study aims at empirically examining the extent to which analysis, heuristics, and intuition cognitions are used to find opportunities and how these cognitions are used to find them. We adopt the naturalistic decision-making paradigm that conceptualizes decision making as a contingency-based process where appropriate cognitions need to match the nature of the task for which the decision is made. This is consistent with calls within the entrepreneurship field for the consideration of context (cf. Gustafsson, 2004).

Our study begins to fill the gap, mentioned above, by addressing the following research questions: a) whether different types of opportunity identification, as discussed by Sarasvathy et al. (2003) would induce different cognitions; b) whether opportunity identification cognitions differ when used by expert entrepreneurs compared to novices, and c) if entrepreneurs use different cognitions depending on whether they were able or unable to identify opportunities.

THE ENTREPRENEURIAL TASK

Taking the ideas of Shane and Venkataraman (2000), Davidsson (2003) and Sarasvathy et al. (2003) as a point of departure one can pose that the entrepreneurial task can be defined as bringing (new) goods and services to the marketplace in a novel and more profitable way. This is the task accomplished by entrepreneurs through venture creation, opportunity identification being its initial stage.

Sarasvathy et al. (2003) suggest their opportunity typology implicitly depending on the uncertainty level as defined by Knight (1921):

1. *"Opportunity Recognition"*
   "If both sources of supply and demand exist rather obviously, the opportunity for bringing them together has to be "recognized" and then the match-up between supply and demand has to be implemented either through and existing firm or a new firm. This notion of opportunity has to do with the exploitation of the existing markets. Examples include arbitrage and franchises." (Sarasvathy et al., 2003, p. 145) It can be pointed out that opportunity recognition occurs under condition of near certainty, as defined by Knight.

2. *"Opportunity Discovery"*
   "If only one side exists – i.e. demand exists, but supply does not, and vice versa – then, the non-existent side has to be "discovered" before the match-up can be implemented. This notion of opportunity has to do with the exploration of existing and latent markets. Examples include: Cures for diseases (Demand exists; supply has to be discovered); and application for new technologies… (Supply exists; demand has to be discovered)." (Sarasvathy et al., 2003, p.145). In terms of uncertainty opportunity discovery occurs then the uncertainty level is moderate.

3. *"Opportunity Creation"*
   "If neither supply nor demand exists in an obvious manner, one or both have to be "created" and several *economic* inventions in marketing, financing etc. have to be made, for the opportunity to come into existence. This notion of opportunity has to do with the creation of new markets. Examples include Wedgwood Pottery, Edison's General Electric, U-Haul, AES Corporation, Netscape, Beanie Babies, and the MIR space resort." (Sarasvathy et al., 2003, p.145) Opportunity creation occurs under condition of "true" (by Knight) or ultimate uncertainty.

It is possible to assume that entrepreneurs in the course of their business life may come to identify any (or all) types of opportunity, from recognition to discovery to creation. Let us now consider what type of decision-making would yield best results depending on the type of opportunity and in accordance with Correspondence-accuracy principle (Hammond, 1988).

According to Hammond (1988) tasks can be categorized as inducing either analysis, or intuition, or quasi-rationality (heuristics). Since we know that analytical tasks are performed most successfully in stable environments, and intuition is a property of naturalistic decision-making that occurs in a (highly) uncertain environment, it is quite logical to associate analysis-inducing tasks with low level of genuine uncertainty, quasi-rational tasks – with moderate level, and intuitive tasks – with high level of uncertainty.

As has been discussed above, each type of opportunity is associated with a certain level of uncertainty: ultimate uncertainty for opportunity creation; moderate uncertainty for opportunity discovery and low uncertainty for opportunity recognition. If we compare the properties of entrepreneurial tasks of opportunity creation/ discovery/recognition with the levels of uncertainty by Knight and cognitive properties by Hammond we can see that a) the high uncertainty task as opportunity creation can be recognized as intuition-inducing; b) opportunity discovery (moderate uncertainty task) can be recognized as quasi-rationality inducing; and c) opportunity recognition (low uncertainty/near certainty) can be recognized as analysis-inducing.

The interrelations between the types of opportunity, level of uncertainty and induced cognitions are demonstrated in Table 1:

Table 1. Types of opportunity and induced cognitions

	Opportunity creation	*Opportunity discovery*	*Opportunity recognition*
Uncertainty level (Knight)	Ultimate ("true"); outcomes/probabilities unknown	Medium; outcomes are known to exist; probabilities become known in time	Low; outcomes/ probabilities are known
Induced cognition (Hammond)	Intuition	Quasi-rationality	Analysis

PROPOSITIONS

Considering decision-making as treated by cognitive continuum theory, and opportunity identification as entrepreneurial task it is possible to draw the following conclusions:

- Decision-making is a joint function of the task, for which the decision is made, and the decision-maker's level of expertise.
- Neither unaided "natural" reasoning, nor elaborated rules based on mathematical and statistical principles per se would guarantee optimal decisions across contexts. According to the Correspondence-accuracy principle (CAP) of the Cognitive continuum theory an optimal decision can only be made if cognitive processes employed match the nature of the tasks.
- Expertise of a decision-maker is thus defined by his/her ability to recognize the task as requiring either analytical, or quasi-rational, or intuitive cognitive processes, and perform these processes in accordance to the task. According to the study by Ericsson et al. (1993) such a superior performance is acquired after many years of prolonged training (i.e. performing tasks in a specific domain).
- As far as entrepreneurs are concerned, it is quite possible to assume that CAP would apply to their decision-making as well. In other words, in order to understand entrepreneurial decision-making one should investigate the task(s) performed by entrepreneur, as well as cognitive processes employed while performing those tasks.
- When analyzed in terms of the Cognitive continuum theory, all types of opportunity fall neatly within the task continuum, with opportunity creation exhibiting the highest uncertainty, and opportunity recognition providing conditions near certainty. Opportunity discovery falls in the grey zone of gradually receding uncertainty.
- According to the Correspondence-accuracy principle, an optimal decision for opportunity creation is made through an expert judgment. In other words, an expert entrepreneur gives his/her judgment regarding the feasibility of a new venture.
- For opportunity discovery expert entrepreneurs might successfully employ specifically entrepreneurial heuristic – effectuation, as well as other heuristics.
- The situation of opportunity recognition, providing conditions of a near-certainty, calls for decisions made analytically, e.g. by means of relevant strategy techniques.
- Since opportunity creation/discovery/recognition occur at different points of the continuum, the cognitive processes employed by expert entrepreneurs would vary depending on the level of uncertainty.

– According to the Naturalistic paradigm in decision-making research, cognitive processes, as described above, are demonstrated by expert decision-makers as opposed to novices. Speaking in terms of cognitive psychology, entrepreneurs, as expert decision-makers are characterized by their ability to match cognitive requirements of the task with the appropriate decision-making mode through the use of expert scripts.

– By contrast, novices either do not possess those scripts or fail to recognize the cues, which would help to retrieve the appropriate script. Their decision-making modes would not match the task requirements.

The study was carried out in a 2x3 mixed groups' experiment where a group of expert entrepreneurs and a group of novices performed three experimental tasks. Experts were defined as serial portfolio entrepreneurs with no less than 7 years experience since the first start-up, owning and running no less than 2 companies at the time of experiment whereas at least one company should be profitable or break even. Novices were defined as aspiring entrepreneurs or beginners with less than 1 year of business experience.

Experimental tasks represented vignettes calibrated according to the Cognitive continuum theory as intuition-inducing (Task 1), quasi-rationality inducing (Task 2) and analysis-inducing (Task 3&4). Each subject in each group has to read the task vignettes and reflect out loud upon whether, to his or her opinion, there was a business opportunity present in the description. These reflections (so called "think aloud protocols" or "verbal protocols") were tape-recorded, transcribed, coded and analyzed. Coding included chunking (dividing the text into least meaningful units (Ericsson and Simon, 1993)) and categorizing each chunk as analytical, quasi-rational or intuitive. All together 55 subjects participated in 4 tasks during the three rounds of data collection and yielded 147 verbal protocols. Expert-novice distribution by task is shown in Table 2:

Table 2. Experimental design: participants and tasks

TASK	*1*	*2*	*3*	*4*	*TOTAL*
Novices	20 (5)	20	20	(5)	25
Experts	17 (13)	17	17	(13)	30
Total	55	37	37	18	55

COGNITIVE PATTERNS IN EXPERTS AND NOVICES

The paper provides an attempt of an exploratory, more interpretative analysis of the data. The statistical analysis relies on "*compare means*" SPSS procedure, when the mean percentage of the intuitive, quasi-rational and analytical chunks is found for experts and novices across tasks. Two more variables are included in the analysis, type of education and business idea discovery. The former is used in order to investigate whether business/management education is more conditioning towards analysis than other type of education. The latter is added in order to investigate whether cognitive patterns differ in the situations of discovery and rejection of venture ideas respectively. Acceptance/rejection situation has been analysed across tasks in three ways: combined for all participants, separately for experts, and separately for novices. The statistical significance of the results has been established through one-way ANOVA as well as with non-parametric tests: Mann-Witney test for 2 independent samples, and Kruskall-Wallis test for K independent samples. The mean values in all tables in this chapter represent relative frequency.

Novices: type of education and cognitive patterns

We can say that the novices in general are significantly more prone to analytical behaviour than the experts, regardless of the nature of the task. However, the novices are a heterogeneous group consisting of a) JIBS students receiving business education (University of Jönköping); b) students of the school of Engineering (also University of Jönköping) and c) novices possessing other type of college/ university training. There is a theoretical rationale behind the inclusion of this variable (type of education) in the analysis. As cognitive psychology states, novices are prone to analytical cognition (Dreyfus & Dreyfus, 1989). However, contrary to the theoretical assumptions, novices demonstrate adaptable, expert-like behaviour It seems logical to see the reason for this deviation of the theoretically predicted behaviour in one of the background variables. The most influential factor, as far as development of expertise is concerned, is the type of education. This is also the only variable where the novices in the study are not matched.

Let us now investigate whether cognitive patterns of business students would significantly differ from a) non-business novices as a group, i.e. engineering students and students receiving other type of education taken together and b) from students of engineering and others separately. The analysis has been carried out across tasks.

Cognitive patterns of novices in intuition-inducing Task 1 are presented in Figure 1 where values represent relative frequencies:

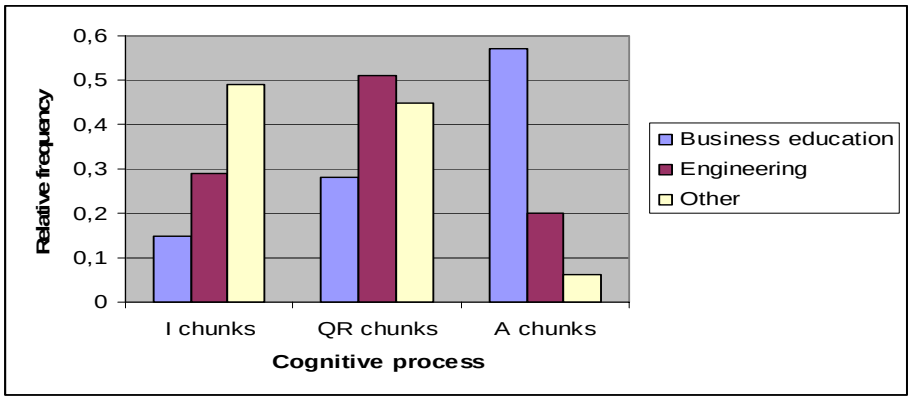

Figure 6.1. Cognitive patterns of novices in intuition-inducing task by areas of education

In order to establish whether the observed differences in the presence of intuition, quasi-rationality and analysis across education groups are statistically significant, two types of non-parametric test are carried out. First, business students are compared with non-business novices by Kruskall-Wallis test; second, business students are compared with engineering students and with other novices, respectively, by ANOVA and Mann-Whitney test. Significance values for these analyses are presented in Table 3 and 3a:

Table 3 Statistical significance of differences in cognitive patterns across types of education

Comparison	**I chunks**	**QR chunks**	**A chunks**
Business/non-business Asymp. Sig[1].	0,115	0,339	0,020
Business/engineering Asymp.Sig. 2-tailed[2]	0,096	0,178	0,079
Business/other Asymp.Sig. 2-tailed[3]	0,125	0,367	0,015

Business students N=17; engineering students N=4; others N=4

[1] Kruskall-Wallis test
[2] Mann-Whitney test
[3] Mann-Whitney test

Table 3a. Difference in cognitive patterns established by ANOVA

	N	Mean	Std. dev.	Sig.
I chunks business	17	0,15	0,16	0,034
engineering	4	0,29	0,17	
other	4	0,49	0,44	
QR chunks business	17	0,28	0,28	0,264
engineering	4	0,51	0,14	
other	4	0,45	0,35	
A chunks business	17	0,56	0,26	0,017
engineering	4	0,20	0,30	
other	4	0,06	0,12	

As the tables demonstrate, business students are significantly more prone to analytical cognition compared to non-business novices. Comparison to the students of engineering yields statistical significance within 90 per cent confidence interval for non-parametric test (ANOVA provides between groups significance at 5% riks); business students are more prone to analytical, whereas students of engineering are more prone to intuitive cognition. Comparison to other novices points out, again, that business students are significantly more prone to analytical cognition.

Thus, it is possible to conclude that in intuition-inducing task business student tend to employ analytical cognition to significantly higher extent than non-business novices.
Let us now investigate cognitive patterns of all three education groups in the quasi-rationality-inducing Task 2. The mean value for each cognition is presented in Figure 2:

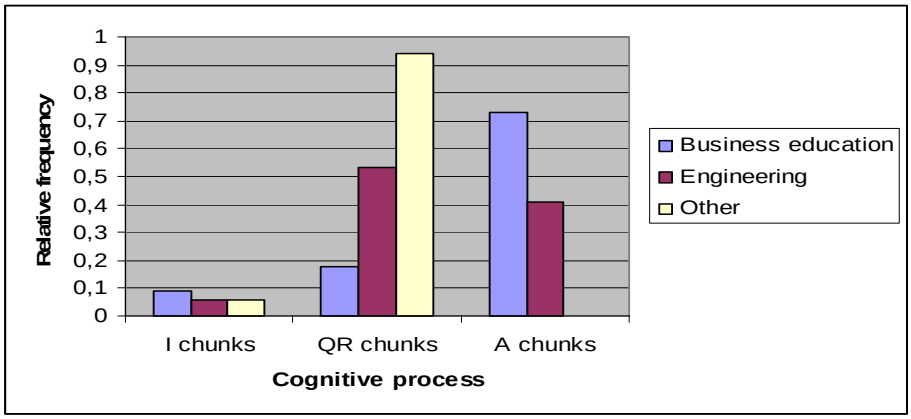

Figure 2. Cognitive patterns of novices in QR-inducing task by areas of education

Again, the statistical significance of differences in cognitive patterns is established by ANOVA, Kruskall-Wallis and Mann-Whitney tests. Significance values for these comparisons are presented in Table 4 and 4a.

Table 4 Statistical significance of differences in cognitive patterns across types of education

Comparison	I chunks	QR chunks	A chunks
Business/non-business Asymp. Sig[4].	0,857	0,020	0,047
Business/engineering Asymp.Sig. 2-tailed[5]	0,676	0,082	0,193
Business/other Asymp.Sig. 2-tailed[6]	0,676	0,021	0,030

Business students N=16; engineering students N=2; others N=2

[4] Kruskall-Wallis test
[5] Mann-Whitney test
[6] Mann-Whitney test

Table 4a. Differences established by ANOVA

	N	Mean	Std. dev.	Sig.
I chunks business	16	0,09	0,18	0,963
engineering	2	0,06	0,09	
other	2	0,06	0,09	
QR chunks business	16	0,18	0,21	0,001
engineering	2	0,53	0,22	
other	2	0,94	0,09	
A chunks business	16	0,73	0,34	0,018
engineering	2	0,41	0,13	
other	2	0,00	0,00	

As the tests make clear, business students are again much more prone to analytical cognition compared to non-business novices, who, in their turn, tend to exhibit significantly higher use of quasi-rationality. Engineers, as compared to business students, are also more prone to use heuristics (significance with 10% risk in non-parametric test and with 5% risk by ANOVA). Comparison between business students and other novices points out that business students are significantly more prone to analytical cognition, whereas other novices make significantly higher use of heuristics.

Again, the general conclusion is that business students are significantly more prone to analytical cognition than non-business novices.
Finally, let us investigate the cognitive patterns of novices in analysis-inducing task. The mean values are presented in Figure 3.

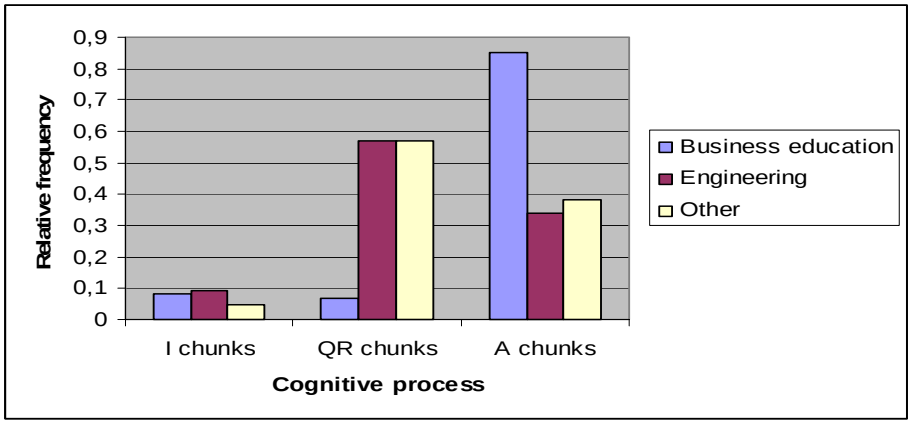

Figure 3. Cognitive patterns of novices in analysis-inducing task by areas of education

The statistical significance of differences in cognitive patterns is once again established by ANOVA, Kruskall-Wallis and Mann-Whitney tests. Significance values for these comparisons are presented in Tables 5 and 5a.

Table 5. Statistical significance of differences in cognitive patterns across types of education

Comparison	I chunks	QR chunks	A chunks
Business/non-business Asymp. Sig[7].	0,185	0,001	0,009
Business/engineering Asymp.Sig. 2-tailed[8]	0,092	0,002	0,016
Business/other Asymp.Sig. 2-tailed[9]	0,338	0,002	0,016

Business students N=17; engineering students N=4; others N=4

Table 5a Differences established by ANOVA

	N	Mean	Std. dev.	Sig.
I chunks business	17	0,08	0,20	0,924
engineering	4	0,09	0,07	
other	4	0,05	0,05	
QR chunks business	17	0,07	0,18	0,001
engineering	4	0,57	0,27	
other	4	0,57	0,31	
A chunks business	17	0,85	0,27	0,002
engineering	4	0,34	0,26	
other	4	0,38	0,29	

Once again the results make clear that business students are significantly more prone to analytical cognition than non-business novices, who, on the other hand, use quasi-rationality to a significantly higher extent. Comparisons with the students of engineering and other novices, respectively, demonstrate similar trends: business students are much more prone to use analysis than any of the non-business groups, whereas the students of engineering and novices possessing other types of training are more prone to use heuristics.

Judging by the results of the tests described above, we can legitimately conclude that business students are significantly more prone to analytical decision-making regardless of the nature of the task. Hence, business education can be considered significantly more conditioning towards analysis than any other type of education.

On the other hand, there is also some indication that non-business novices are more prone to use quasi-rational cognition; at least, such a trend is demonstrated in two tasks out of three – quasi-rationality and analysis-inducing tasks.

Yet the conclusions above should nevertheless be regarded as rather tentative, due to two reasons. First, the number of students of engineering and other novices was very low: four participants in each group. Second, these results were not based on hypotheses derived a priori from entrepreneurship theory. Thus, even though the first exploratory results point out at an unexpected and intriguing trend, the issue of business education's conditioning nature is by no means resolved and requires further research.

COGNITIVE PATTERNS AND VENTURE IDEA DISCOVERY

The participants, either experts or novices, were not prompted to a positive answer while reflecting over their tasks. In other words, a decision was good for the purpose of the study regardless of whether the participant discovered a venture idea or failed to do so, i.e. rejected the situation as potentially unpromising.

[7] Kruskall-Wallis test
[8] Mann-Whitney test
[9] Mann-Whitney test

Still, it would be worth investigating whether the participants' cognitive patterns differ depending on their acceptance or rejection of the situation. One may also wonder if these cognitive patterns would be different for experts and novices.

In order to provide answers to these questions, cognitive patterns of all subjects, both experts and novices, were investigated across tasks with respect to whether a venture idea was found or rejected. The mean value for each cognition was identified in each task. Statistical significance of the results was obtained through ANOVA and Mann-Whitney test.

General cognitive patterns and venture idea discovery

The cognitive patterns observed in the intuition-inducing tasks are presented in Table 6:

Table 6. Cognitive patterns and venture idea discovery in intuition-inducing task

Venture idea Task 1	**N**	**I chunks**	**QR chunks**	**A chunks**
Rejected	26	0,35	0,47	0,18
Discovered	29	0,19	0,41	0,40
Asymp. Sig. (2-tailed)		0,018	0,399	0,001
Sig. ANOVA		0,006	0,425	0,010

As can be observed from Table, the cognitive patterns do differ in acceptance and rejection situations. Intuition is used to a significantly higher extent in rejection, whereas analysis plays the leading role in acceptance.

Let us now consider the cognitive patterns in quasi-rationality-inducing task. The results are presented in Table 7:

Table 7. Cognitive patterns and venture idea discovery in quasi-rationality-inducing task

Venture idea Task 2	**N**	**I chunks**	**QR chunks**	**A chunks**
Rejected	22	0,14	0,32	0,54
Discovered	15	0,06	0,49	0,45
Asymp. Sig. (2-tailed)		0,590	0,111	0,708
Sig. ANOVA		0,279	0,161	0,504

The quasi-rationality-inducing task appears to be the most confounding for the participants. There is a slight difference in acceptance and rejection situations; however, none of these differences is statistically significant. Let us now investigate cognitive patterns in the analysis-inducing task. The results are found in Table 8:

Table 8. Cognitive patterns and venture idea discovery in analysis-inducing task

Venture idea Task 3&4	**N**	**I chunks**	**QR chunks**	**A chunks**
Rejected	18	0,23	0,21	0,56
Discovered	37	0,05	0,29	0,66
Asymp. Sig. (2-tailed)		0,015	0,144	0,426
Sig. ANOVA		0,002	0,332	0,321

Similar to the intuition-inducing task, the presence of intuition is significantly stronger in rejection. However, we cannot claim the analysis to be significantly stronger in the analysis-inducing task.

So far, it is possible to observe that in two tasks out of three intuition is significantly stronger in rejection decisions. Notably, this pattern emerges in the tasks inducing clear-cut cognition: either intuition or analysis. There is also a tendency for analysis to be significantly more

prominent in the acceptance situation in the intuition-inducing task. One may wonder, however, if this rather weak pattern can become more pronounced should cognitive patterns of experts and novices be analysed separately.

Cognitive patterns of experts and venture idea discovery

To obtain an answer to the question above, let us first consider cognitive patterns of experts in acceptance or rejection situations across tasks. Cognitive patterns of experts in intuition-inducing task are presented in Table 9:

Table 9. Experts: Cognitive patterns and venture idea discovery in intuition-inducing task

Venture idea Task 1	N	I chunks	QR chunks	A chunks
Rejected	14	0,39	0,52	0,09
Discovered	16	0,20	0,49	0,31
Asymp. Sig. (2-tailed)		0,013	0,771	0,001
Sig. ANOVA		0,009	0,740	0,007

As the table makes clear, the experts demonstrate statistically significant differences in cognitive patterns pertaining to acceptance and rejection situation. Expert entrepreneurs are much more prone to use intuition for rejection, whereas a discovery of a venture idea demonstrates the strong presence of analysis. In general it is also possible to note that the experts' tendency to use more intuition for rejection and more analysis for acceptance in intuition-inducing task does not differ from the general trend in the same task.

The experts' cognitive patterns in quasi-rationality-inducing task are found in Table 10:

Table 10. Experts: Cognitive patterns and venture idea discovery in QR-inducing task

Venture idea Task 2	N	I chunks	QR chunks	A chunks
Rejected	9	0,19	0,44	0,37
Discovered	8	0,06	0,58	0,36
Asymp. Sig. (2-tailed)		0,297	0,440	0,596
Sig. ANOVA		0,321	0,457	0,952

It is possible to observe, once again, that there exists no clear pattern of cognitive differences in acceptance or rejection situation in the quasi-rationality induced task among the experts. Apparently, the confounding nature of the task does not permit such a pattern to emerge.

Now let us again consider the cognitive patterns of experts in the analysis-inducing task. The results are found in Table 11:

Table 11. Experts: Cognitive patterns and venture idea discovery in analysis-inducing task

Venture idea Task 3&4	N	I chunks	QR chunks	A chunks
Rejected	8	0,35	0,25	0,40
Discovered	22	0,06	0,30	0,64
Asymp. Sig. (2-tailed)		0,003	0,604	0,067
Sig. ANOVA		0,002	0,665	0,075

In the analysis-inducing task the experts demonstrate a clear tendency to use intuition to a significantly higher extent in the situation of rejection, whereas in the situation of acceptance there is a significantly stronger presence of analysis10. This tendency differs from the general situation, where only intuition is significantly higher in rejection, and the use of analysis in acceptance or rejection demonstrates no significant differences.

[10] Within 90 per cent confidence interval for both tests

Novices: Cognitive patterns and venture idea discovery

Let us now compare the cognitive patterns of novices in acceptance or rejection situations across tasks. The results of such analysis in the intuition-inducing task are presented in Table 12:

Table 12. Novices: Cognitive patterns and venture idea discovery in intuition-inducing task

Venture idea Task 1	N	I chunks	QR chunks	A chunks
Rejected	10	0,30	0,37	0,33
Discovered	15	0,18	0,33	0,49
Asymp. Sig. (2-tailed)		0,577	0,867	0,227
Sig. ANOVA		0,240	0,696	0,289

It is easy to notice that in the intuition-inducing task, novices demonstrate no significant difference of their cognitive behaviour in either acceptance or rejection situation. Let us now investigate the cognitive patterns of novices in the quasi-rationality-inducing task. The results are found in Table 13:

Table 13. Novices: Cognitive patterns and venture idea discovery in QR-inducing task

Venture idea Task 2	N	I chunks	QR chunks	A chunks
Rejected	13	0,10	0,24	0,66
Discovered	7	0,06	0,38	0,56
Asymp. Sig. (2-tailed)		0,889	0,169	0,491
Sig. ANOVA		0,588	0,340	0,604

As expected, the novices demonstrate no significant difference in their use of intuition and analysis in the rejection and acceptance situation. To complete the analysis, let us consider the cognitive patterns of novices in the analysis-inducing task. The results are found in Table 14:

Table 14. Novices: Cognitive patterns and venture idea discovery in analysis-inducing task

Venture idea Task 3&4	N	I chunks	QR chunks	A chunks
Rejected	10	0,14	0,17	0,69
Discovered	15	0,04	0,27	0,69
Asymp. Sig. (2-tailed)		0,422	0,232	0,750
Sig. ANOVA		0,145	0,462	0,990

Yet again the novices demonstrate no significant difference in their cognitive behaviour in the acceptance and rejection situation. Thus, it becomes possible to conclude that experts and novices exhibit different cognitive behaviour in the intuition-inducing and analysis inducing tasks as far as acceptance or rejection of a venture idea is concerned. The experts exhibit clear trend: they are much more prone to use intuition in rejection, whereas discovery of a venture idea demonstrate a strong use of analysis. The novices, on the other hand, do not demonstrate any clear pattern in their decision behaviour. Neither does any trend emerge in any group of subjects in the quasi-rationality-inducing task.

EXPERTS' COGNITIVE PATTERNS: WHY DO THEY DIFFER?

So, the question begs itself: what are the possible reasons for such distinct decision-making patterns to emerge? It is possible to suggest two explanations.

An observation that first springs to mind is that the experts demonstrate significant difference of cognitive patterns only in the intuition-inducing and the analysis-inducing tasks. In these situations of either very high or very low uncertainty (the two poles of the task continuum),

the experts are prone to use intuition if they reject the situation's potential, and they use analysis to make the discovery.

It must be noted that such behaviour seems at variance with the Correspondence-accuracy principle (CAP): if the task is intuition-inducing, any behaviour is expected to be aided by intuition, not analysis. In the analysis-inducing task the situation is the reverse: here, according to the CAP, an optimal decision is to be made by means of analysis, be it acceptance or rejection.

One possible explanation is to suggest that the experts use intuition and analysis not only as the means of thought structuring but also as inhibitors of perceived uncertainty (perceived, because in the analysis-inducing task genuine uncertainty is already very low). This conclusion seems justified due to the cognitive properties of both intuition and analysis: intuition provides high confidence in answer, whereas analysis provides high confidence in method (Hammond, 1987; Hammond, 1988). Thus, it seems quite natural to use both cognitions to bring down the level of perceived uncertainty.

This conclusion, although seemingly possible, provide little explanation from the point of view of entrepreneurship research, pertaining rather to the field of cognitive psychology. Yet there exists another, "entrepreneurial", explanation of these puzzling differences.

In general, entrepreneurship research suggests two rival explanations for the cognitive nature of a venture idea discovery: first, as a result of a systematic search (cf. Fiet, 2002) and second, as a result of a serendipitous flash of insight, "entrepreneurial alertness" (cf. Gaglio and Katz, 2001).

In terms of cognitive behaviour systematic search is predominantly analytical. Thus, we may assume that expert entrepreneurs are quite prone to analytical behaviour when they discover a venture idea. This can be an argument in favour of the systematic search theory. However, this conclusion is only tentative and should be corroborated by further research.

IMPLICATIONS

The present study can provide immediate ground for several research attempts:

– The present study involves two opposite (though not extreme) groups of entrepreneurs: experts and novices, who differ by their level of entrepreneurial expertise. The issue of expertise development, however, has not been addressed. It can be important to investigate judgment, learning and expertise – what entrepreneurial knowledge is and how it is applied. Similar, equally important issue is how entrepreneurs can acquire knowledge and how this knowledge acquisition and skill development can be improved (Shepherd, personal communication). If, as literature indicates, entrepreneurial expertise presumes creation of expert script(s) (cf. Mitchell and Chesteen, 1995), then proceduralisation of declarative knowledge and transfer of tacit knowledge would come into focus and ought to be investigated.

– The post-hoc analysis leads to several unanticipated but intriguing conclusions a) that business education appears to be strongly conditioning towards analysis; b) that expert entrepreneurs use intuition mostly in rejection, and analysis – in acceptance of a venture idea. However, as mentioned before, the analysis carried out involves a small sample and hence possesses little statistic power. Replication of the experiment with larger sample (and more pointed research questions) would increase power and substantially improve generalisability. Presumably conditioning nature of business education should be addressed and either confirmed or disconfirmed, since it will have important implications for entrepreneurship education.

As already discussed, the present study is theory-driven; its major theory source is derived from cognitive psychology. This proved a fruitful approach; however, the theoretical and methodological basis of the future research can be substantially extended should a newly

emerged framework, entrepreneurial cognition, become adopted. Entrepreneurial cognition is a relatively new area within the field of entrepreneurship based on entrepreneurship theory and empirical research as well as cognitive psychology.

Development of normative advice for practitioners is an important and at times overlooked contribution. Entrepreneurship research is sometimes regarded as descriptive only; however, it is not about trying to find out about current practice. This is a very narrow and delimiting view, which sentences entrepreneurship research to always lag behind entrepreneurship practice (Davidsson, 2003).

To study what successful entrepreneurs have done is important, but an even more important and interesting question is what could be done right now, before somebody else pre-empts an opportunity that is open at this very moment. Entrepreneurship scholars should be able to answer this question, and be able to translate the answer into normative recommendations for practitioners, and this is another implication of the present study. And, finally, but not the least important, entrepreneurship educators could emphasize developing such skills among their students. In the long run one more implication of the present study is providing a doer training, which makes students not only smart critics, but competent actors (Davidsson, 2003).

An example of such a project possessing high practical value can be a replication of Hammond's (1987) study. To conduct the study the researchers created and used very precise indices of task uncertainty. Creating similar indices for entrepreneurial tasks could become an important aid for the practitioners enabling the increased level of awareness about the uncertainty level. In other words, while assessing a venture idea entrepreneurs could use an analytical tool instead of relying solely on their own experience.

And yet, such a highly analytical approach holds potential pitfalls, since eventual faults in the analysis tend to cause much more severe consequences compared to faults of judgment (misdirected intuition) (Hammond, 1987). Bearing this in mind, an opposite approach can be suggested. If assessment of a market situation is a skill (as has been proved in the present study), it can be also improved not analytically but heuristically. In other words, expert entrepreneurs could hone their skills and novice entrepreneurs can become experts in a somewhat similar way as chess players, pilots or intelligence agents. Through participation in carefully constructed simulations entrepreneurs become exposed to an extensive variety of market situation, which should enable development of relevant cognitive schema and increase of entrepreneurial decision-making skills.

The present study also has certain educational implications. According to the results, expert entrepreneurs are doing quite well, and their decision-making is quite close to optimal. Novices, on the other hand, are rather prone to excessively analytical behavior, which may potentially lead to sub-optimal decisions. In other words, this is the situation assessment skills, which differentiate experts from novices, and recommendations should facilitate its development.

Developing expert skills may require as much as seven to ten years (Ericsson and Smith, 1991) regardless of the area of skill acquisition. Yet, as far as entrepreneurship is concerned, acquiring superior decision-making skills in the domain would imply exposure to a variety of business settings, in which potential discoveries of a venture idea may occur. In other word, in order to become an expert, a novice entrepreneur should encounter situations from the whole range of the task continuum (from highly uncertain to quite certain), and acquire tacit knowledge (or develop cognitive schemata) concerning the optimal behavior in each situation.

Logically, a successful teaching strategy should then aim at increasing novices' exposure to the maximum variety (uncertainty-wise) of entrepreneurial situations. If students are trained for one type of situations only (be they analysis-inducing or intuition-inducing), the education would be of little use. In such a case the students can hardly develop the skill of situation assessment, and their decisions in unfamiliar situations are likely to be inadequate.

Success in training across a variety of situations can be achieved through simulations. As discussed, different simulation settings, from behavioral simulations to microworlds, are able to provide entrepreneurial situations within the whole range of the task continuum. Moreover, such situations can be rigorously constructed and calibrated, the latter being highly important for the education purposes. And, the last but not least, upon completion of a simulation task the novices will be provided with the most detailed (if necessary) feedback. Since knowledge is acquired and skills are developed only on the basis of feedback, this feature of simulated tasks makes them indispensable in entrepreneurship education.

Apart from simulations, there are other ways to achieve this goal, e.g. pairing novices and experts, as has been demonstrated by Mitchell and Chesteen (1995).

There is still a question about the role of declarative knowledge in the entrepreneurship education. The author of the present study believes that providing the knowledge of facts and developing analytical skills (e.g. business planning) can be by no means ignored. Indeed, as demonstrated in the discussion of the expertise development, the expert intuition is based on extensive knowledge, both declarative and procedural (knowledge of facts coupled with skills). Moreover, a number of entrepreneurial situations are either quasi-rationality or analysis-inducing and thus require analytical skills or ability to use professional heuristics or combination of both.

One of the most important questions in entrepreneurial education concerns the possibility to teach students to identify an opportunity. Indeed, opportunity identification is the initial stage of venture creation, which often occurs in the setting of high uncertainty. Whether opportunity identification can be taught was investigated by Saks and Gaglio (2002).

Some entrepreneurship researchers also hold an opinion that opportunity identification should not be regarded as a more or less serendipitous flash of insight, but as a systematic search. This view is clearly expressed Fiet (2002), who has experimentally confirmed that providing students with the extensive knowledge as well as teaching them how to conduct systematic search would substantially increase their chances to discover a venture idea.
However, the author of the present study does not regard these two approaches as controversial, but rather perceives them as complementary. A summary of different teaching methods and education forms in entrepreneurship with their theoretical background as well as contribution to development of entrepreneurial skills is found in Table 14:

Table 14. Different forms of entrepreneurship education

Teaching method	Theoretical background	Contribution to skill development
Theoretical reading (classical method)	Acquiring declarative knowledge	Enables acquisition of analytical skills; predisposes development of sound judgment (use of intuition skills). Usually disregards cognitive nature of the task and therefore requires subsequent training through participation in simulated tasks.
Reading business cases (classical method in management/ entrepreneurship education)	Acquiring professional heuristics (declarative knowledge)	Predisposes development of situation assessment skill; does not explicitly consider cognitive nature of the task and therefore requires subsequent training through participation in simulated tasks.
Systematic search for opportunity (Fiet)	Increases sensitivity to possible misbalances/opportunity sources	Trains analytical skills.
Participation in simulated tasks of varied complexity and uncertainty (present study)	Increases exposure to entrepreneurial tasks of varied uncertainty; facilitates development of cognitive schema	Enables development of all entrepreneurial skills: situation assessment, use of intuition, analysis and professional heuristics in relevant task conditions. Must include extensive feedback.
Entrepreneurial mentorship (Mitchell and Chesteen)	Facilitates development of cognitive schema	As above; success depends on the degree of maturity of mentor's schema. Should include feedback/ debriefing.

Summing up, it is possible to conclude that what novice entrepreneurs require is knowledge of facts, as well as acquisition of various skills: of analysis, on the one hand, and of situation assessment, on the other. Also they need to acquire professional heuristics and develop the ability to use them. And there are very many ways through which this knowledge and be acquired and skills can be developed, be it entrepreneurial mentorship, systematic search, or creation of a simulated venture. Success of future entrepreneurs is fostered by providing stable and reliable theoretical grounds, as well as by introducing rigorously tested methods of education and research.

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