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The Impact of Producers' Cognitive Styles on their Purchasing Behavior

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ABSTRACT

This paper inquires on the impact of cognitive styles over the decision-making process producers perform while making input and capital equipment purchases. We will question if Argentine farmers with diverse cognitive styles have different purchasing behaviors when buying the inputs they use in their farming operations. Cognitive styles express differences in the way decision-makers process information and organize knowledge.

Results show that different segments of producers have distinctive purchasing behaviors. Specifically, analytic-oriented producers tend to focus more on product performance and less on the relationship with suppliers when buying their inputs. They also tend to be loyal to input brands, they rely less on dealers/retailers and salespeople, and they are willing to change suppliers more often than other producers. Intuitive-oriented producers value more the relationship with the supplier and are interested in contacting the salesperson if they need a product. While balanced-oriented producers declare to be less loyal to brands but are more stable in terms of not changing input suppliers frequently.

This characterization of producers has important business implications, since identifying and segmenting the different types of producers with different cognitive styles and distinctive buying profiles is a key aspect of the strategic marketing plan of any company in the input markets. To our knowledge, this is the first paper on the topic of cognitive styles of Argentine producers and their impact on their purchasing behaviors.

Keywords: *Argentine producers; purchasing behavior; cognitive styles*

1 Introduction

Producers make their business decisions under uncertain conditions, taking into account a great number of factors such as changes in agronomic, environmental and weather conditions; other factors such as varying commodity prices, input product complexity, and fluctuations in the financial and macroeconomic context have a big impact (Abaci et al., 2017).

Considering producers as strategic decision-makers subject to bounded rationality, their decisions are based on an incomplete and imperfect interpretation of the environment. This leads to information biases, which can affect their strategic choices. Thus, in complex and overloaded information contexts, decision-makers will tend to simplify complex cognitive problems, which may limit their options and the final decision (Kim, et al., 2006; Kahneman, 2003).

When making their purchasing decisions for inputs, producers face these same restrictions. These purchases are strategic for the success of their business, and also time consuming, in terms of information acquisition and evaluation of alternatives. Producers' input buying behavior can be explained by different factors, such as the so-called 'buying task characteristics' (product and market related characteristics), buyers' characteristics (farm enterprise and individual characteristics) and the general environment (social, cultural, economic, political/legal, technological, and physical). The combination of these factors in input purchasing can involve complexity in the decision-making process (Kool et al. 1997).

Decision-making differences among producers have been explained in the past by different authors due to various reasons: by differences in producers' individual characteristics and resources, and by belonging to different reference groups and institutional environments (Ambrosius et al., 2015). However, in this paper we will focus on producers' differences in input purchasing decision-making due to their distinctions in terms of cognitive styles. Cognitive styles are the preferred ways of cognition organization and functioning of decision-makers. These decision-makers may differ in the ways they process information and the methods they use to organize knowledge, which will have an impact on their decisions.

Thus, in this paper, we will focus on the question of what the impact of cognitive styles is on the decision-making process producers perform while making input and capital equipment purchases. Specifically, we will question if producers with diverse cognitive styles have different purchasing behaviors when buying the inputs they use in their farming operations.

In the next section, we will review the concept of cognitive styles and connect this concept with producers' purchasing behavior, as well as setting some hypotheses. We will follow by introducing the data and methodology used in this paper, report the results, and end with conclusions and final remarks.

2 Literature Review and Hypotheses

2.1 Cognitive Styles

Cognitive styles refer to individual differences in the way people represent, organize and process information during thinking, decision-making and problem solving. They are conceptualized as characteristic modes of perception, problem solving and decision-making, which are inferred from consistent ways of organizing information and experience. Thus, people with different cognitive styles would have diverse preferences in terms of perception, thinking and judgment (Akinci et al., 2013; Messick, 1984, 1996).

People tend to think about decision-making problems with two complementary mental processes: analytical and intuitive thinking. While intuition is an automatic and pre-conscious process involving the development of heuristics and the use of experience, analytical thinking is a deeper and more effortful process. Analytical thinking tends to be more formal, a step by step approach to problem solving, while the intuitive approach tends to be a faster and relatively carefree approach. Intuition results from learning through experience and the development of a feeling of knowing, which activates in response to a stimulus (Hayes and Allison, 1996; Epstein et al., 2001).

There is a general agreement on the characteristics that distinguish intuitive and analytical thinking. Intuitive operations are fast, automatic, effortless, and often emotionally charged; they are often governed by habit and are difficult to monitor or change. Intuitive thinking is also

characterized by the feature of accessibility: they are thoughts that come to mind spontaneously. Analytic operations, on the other hand, are slower, serial, effortful, and deliberately controlled; they also tend to be self-governed and flexible (Stanovich and West, 2000; Kahneman, 2003).

Intuition provides very fast impressions regarding the attributes of the objects perceived, while the analytic process turns beliefs and impulses into voluntary acts. Balancing the use of these two approaches would mean switching back and forth from one approach to another, according to the most appropriate circumstance to which each one fits. However, switching cognitive styles frequently is difficult, as decision makers tend to have preferences in the way information is organized and processed (Kahneman, 2011; Hodgkinson et. al., 2007).

It had been thought in the past that the analytical framework yielded better results than pure intuition when making decisions and judgments. However, there is evidence that the analytic approach is not always advantageous for the quality of the decision-making. Many authors have highlighted the importance of intuition in decision-making under uncertainty, and even have asserted that, in certain domains, intuition is assumed to yield better decision-making quality (Dijkstra et al., 2013).

It also has been observed that expert decision-makers in business are not always able to verbalize the reasons for their decisions: They frequently arrive at solutions and make decisions rapidly, without being able to report how they attained that result, often times based on their expertise. Expertise in management fields is not only defined by explicit knowledge, but also by experience, which allows managers to recognize patterns, which are familiar elements in a situation, and act in a manner that is appropriate to it (Kahneman, 2011; Dijkstra, 2013).

Cognitive style measurement is based on contrasting different predominant cognitive modes under which decision-makers operate. These cognitive style differences can be inferred comparing performance between poles of two different style dimensions: analytic and intuitive. Such measurement of cognitive styles intends to contrast the typical performance of individuals in a cognitive style dimension, measured in a bipolar scale (Messick, 1994).

The contrasted measurement approach in cognitive performance implies that a cognitive style represents a balance between alternative modes by which a person processes and organizes information. This perspective, based on the relative balance between contrasting cognitive modes, suggests that people in the middle of the style distribution have both cognitive modes and propensities at a varying degree. Thus, these observed individuals in the middle of the distribution may be more flexible in expressing opposite cognitive propensities under different situations. In the same way, those individuals in the extremes of the continuum of the bipolar scale would be relatively fixed in their cognitive mode (Messick, 1996).

2.2 Purchasing behavior and cognitive styles

Regarding their purchasing behavior, producers have been portrayed as a special type of industrial buyers. This is, technically qualified buyers of rather complex products such as agricultural inputs, which are dependent on their agro-economic potential contribution. Producers' purchasing behavior is characterized as a problem-solving situation, in which the producer is selecting an agri-product brand and an input supplier. It is assumed that the producer places a variable degree of cognitive and behavioral effort into the buying process, in terms of information search and evaluation of alternatives (Kumar et al., 2018; Kapur et al., 2014; Dharni et al., 2011; Kool et al. 1997; Kool 1994).

This cognitive and behavioral effort is called 'the extensiveness of producers' buying process', which is defined as 'the amount of information acquisition and evaluation of alternatives performed by the producer in order to prepare the purchase of a farm input' (Kool et. al. (1997), page 304).

The concept of 'need of cognition' in decision making links the producers' purchasing behavior with their cognitive styles. The need for cognition is a personality trait, which refers to a stable individual difference in the inclination to engage in an effortful cognitive activity. People with great need of cognition make a deep assessment of information and use systematic rules to process information regarding a complex purchase. While people with low need of cognition would rather rely on other people's views and base their attitudes on simple decision rules and cues to make that decision (Woodham et al., 2017; Lin et al., 2011). Thus, analytic-oriented producers would use more systematic rules and make a deeper assessment of information to evaluate the purchase of

agricultural inputs; while intuitive-oriented producers would use more simple rules and cues to make the purchasing decision.

Agricultural input purchases can be classified according to the complexity that the buyer faces, in terms of product adoption and certainty reduction, into routine or problem-solving products. In the routine type of purchase, the buyer has no problem regarding the use of the product and has no doubts whether the product will perform the task for which it is required. For performance-solving type of products, on the other hand, the buyer has doubts as to whether the product will perform satisfactory in the application for which is being considered (Lehmann et al., 1974; Tiessen et al., 1993).

Agricultural capital equipment and seeds can be considered as the most relevant agricultural inputs, in terms of their agronomical impact on the final product (Moss, 2011; Walley, 2007). Thus, they tend to be more complex products to evaluate, or performance problem type of products; while inoculants, crop protection and fertilizers would be considered more routine-oriented products or relatively simpler agricultural input purchases (Kool et al., 1997; Tiessen et al., 1993; Lehmann et al., 1974).

The main attributes of agricultural input products are price, product performance, and supplier relationship. According to Treacy and Wiersema (1995) these three components of a product are where firms can create competitive advantages. Firms must achieve at least a minimum threshold for each of these three features, as they must be competent broadly, but in order to obtain success they must focus and differentiate in one of these three distinctive elements.

Agricultural input performance refers to agronomical or technological performance of the input, which can be time consuming and hard to assess, but key to select performance-oriented agricultural products. The alternative way to ensure a good quality performance-oriented product would be through the advice of a supplier the producer trusts, or 'supplier relationship', which would be an easier and less time-consuming procedure. On the other hand, for routine-oriented products, price would be ranked relatively higher than for performance-oriented products and performance easier to assess.

From this we formulate our first two hypotheses, related to producers' cognitive styles and product attributes:

$H0_1$: Analytic-oriented producers will tend to rank higher 'product performance' than intuitive-oriented producers.

$H0_2$: Analytic-oriented producers will tend to rank lower 'supplier relationship' than intuitive-oriented producers.

The purchase decision can also change depending on the complexity of the problem to be solved, the newness of the buying requirement and the number of people and the amount of time involved. The more complex the purchase decision in terms of the problem and people involved, as well as the information and time required, the more valuable a strong brand becomes. Similarly, as the degree of uncertainty and risk grows, the relevance of brands may grow as well, as a decision heuristic (Gomes et al., 2016; Brown et al., 2011; Tiessen et al. 1993).

In utilitarian contexts, such as agricultural input marketplaces, there is a need of a cognitive-based explanation of product brand choice. In these markets, brands can benefit the purchaser by increasing buying confidence in a process where emphasis is given to risk reduction, especially when the purchase involves significant expenditures and possible technical problems. Brands can also reduce perceived risk by becoming a reliable and consistent sign of product quality. Also, purchasers can profit by associating themselves with respected leading suppliers, and in this way, corporate reputation/brand also positively can influence buying behavior. Brands can also serve as a tool for dealing with information overload and simplifying product selection. Furthermore, brands increase the confidence in decision-making and make the producer feel more satisfied with their purchase, as buying a familiar brand can contribute with a 'satisfying' factor (Woodham et al., 2017; Gomes et al., 2016; Walley et al., 2007).

Additionally, past research shows that brand/dealer loyalty is widespread among agricultural producers and that brand/dealer loyalty has been found to be a determinant of, or at least correlated with, producers' purchasing decisions (Harbor, 2006).

Thus, brand/dealer loyalty would be a useful tool in order for producers to reduce risk uncertainty and ensure product quality for complex purchases, such as performance-oriented products.

Accordingly, we can expect producers' brand/dealer loyalty to be higher for performance-oriented products than for routine-oriented purchases. Also, as all producers will tend to reduce risks in the purchase of these performance-oriented products, so we do not expect differences in brand/dealer loyalty among producers with different cognitive styles.

From this we formulate the following hypothesis, regarding brand/dealer loyalty for performance-oriented products for both analytic and intuitive-oriented producers:

$H0_3$: Analytic-oriented producers and intuitive-oriented producers should not show differences for brand/dealer loyalty in the context of performance-oriented products.

These purchases are usually embedded in long-term relationships between producers and suppliers, such as dealers/retailers and input salespeople, since purchasing acts are conditioned by past experiences. Thus, the past relationship between producers and suppliers, as well as the commitment shown by producers to these suppliers, has an impact on the present purchasing decisions (Kool 1994). We also know from past research that Argentine producers find the local dealer salespeople or technicians as the most useful source of information on inputs purchases (Burguert, 2011); and that producers seek advice from established dealers with whom they have good relationship, which increases their dependence on suppliers (Kapur and Kumar, 2014). This would suggest that the producer relationship with dealers/retailers and salespeople has an impact on the present purchasing behavior of producers.

As analytic-oriented producers focus more attention and time on product performance than on supplier relationship, and intuitive-oriented producers rely more on the relationship with the supplier than analytic-oriented producers to select their purchases, we suggest that the relationship with dealers/retailers and salespeople with be stronger for intuitive than for analytic-oriented producers.

From this we formulate the following hypothesis:

$H0_4$: Analytic-oriented producers will rely less on dealers/retailers and on salespeople to select their products than intuitive-oriented producers.

3 Data and Methodology

3.1 Data Description

The main source of information of this paper is "The Needs of the Argentine Agricultural Producer 2017" survey, carried out during the months of June and July of 2017, by Austral University, on 818 producers in the main agricultural provinces of Argentina. These producers are representative of around 85% of the soybean production in the main agricultural area of the country, called Humid Pampa[1], in which 70% of soybeans are produced. These producers also produce a significant proportion of the production of corn and wheat.

The survey is based on a questionnaire with 58 questions, which were responded through personal interviews with each one of the producers, in their own farms. The interview lasted an average of 60 minutes each. In one of the questions of the survey, producers were asked how they considered they made their decisions regarding most of the purchases of inputs and capital equipment: Was it made in a more 'intuitive' or in a more 'analytical' style? They had to answer it based on a scale from 1 'intuitive decision-making' to 9 'analytical decision-making'. They were explained that an intuitive decision is based more on the experience and insights of the producers, while the analytic decision is based on the available documentation and information that supports the purchasing product's description.

We also drew from the same survey producers' socio-demographic and purchasing behavior data. This will be used in this paper to describe the socio demographic background of producers with different cognitive styles.

[1] Similar to the 'corn belt' in the US.

3.2 Method

Based on a self-reported assessment instrument, we made a statistical descriptive analysis to characterize the differences in the purchasing behavior of Argentine producers with three different cognitive styles: analytic, balanced[2], and intuitive. We classified the 1-9 scale respondents, where 1 is fully intuitive and 9 fully analytical, into three different groups: those who answered 1-3 were classified as intuitive producers; balanced producers are those who responded 4-6, and finally the analytic group includes those who responded 7-9.

Regarding cognitive assessment, we used the self-reported method to assess producers' cognitive styles. Since we have a large set of data of producers, all of the producers got the same instructions to respond the questionnaire, and the questions are related to a specific farming context, we consider it would suffice to ensure reasonable chance to obtain fairly good responses. On the other hand, it would be very difficult, and too expensive, to reach out to a significant number of producers with more than one data collection/measurement instrument mode.

We performed an unconditional analysis to capture the plausible differences in purchasing behavior among groups (analytical, balanced and intuitive): analysis of variance (ANOVA) and Pairwise comparison tests. The ANOVA method allows testing multiple population means and analyzing if there is at least one difference, but does not provide information about identifying individual differences between groups. The Pairwise test allows us to do so, as it analyzes multiple population means in pairs to determine whether there are significant differences between one group and another. As multiple statistical tests are made simultaneously, the Bonferroni correction method was also performed[3]. The advantage of the unconditional analysis is that it is an easy way to have a first view of the relationship between cognitive styles and purchasing behavior.

The different purchasing behaviors of producers on which we want to focus our analysis are based on the following four issues:

1. Input attributes ranking. Producers were asked to rank the attributes of inputs in order of importance: Price, Product Performance, and Supplier Relationship. Responses should be made choosing one option from a scale of 1 to 3, where 1 is most important, 2 less important, and 3 the least important.
2. Producers' loyalty to brand and dealer/retailer. A producer is considered to be brand loyal, as a combination of his willingness to do more business with the brand he actually purchases, his endorsement of the brand to his neighbors, and that he declares he would not change brands even if prices go up more than 10%. Similar definition is used for loyalty to dealer/retailer.
3. Relationship with retailers. Regarding if the producer changed suppliers of his main inputs in the past five years, and the reasons why he changed; and also which are the most important factors in selecting dealers/retailers.
4. Relationship with salespeople. In terms of the main reasons that leads the producer to contact a salesperson, and the factors that would make him willing to meet a salesperson who he actually does not purchase products from.

These issues are going to be analyzed in this paper in terms of five inputs: seeds, inoculants, crop protection, fertilizers and capital equipment.

4 Results

4.1 Descriptive Statistics

We present the frequency distribution of producers, as how they answered in the survey, if they considered themselves intuitive, balanced, or analytic, in the 1-9 scale. The intuitive producers are those who answered in the range of 1-3, the balanced producers are those who responded 4-6, and the analytic producers are those who responded 7-9.

[2] In the previous section, we explained that cognitive style measurement is based on a relative balance between contrasting cognitive modes by which people organize and processes information, with the analytic and intuitive modes in the extremes of two poles. The people in the middle of the style distribution, who have both cognitive modes to varying degree, we call them 'balanced'.

[3] The Bonferroni correction adjusts probability (p) values because of the increased risk of a type I error when making multiple statistical tests (Oehlert, 2010).

As we can see in Table 1, we have a total of 35 respondents in the 1-3 scale (intuitive), 343 in the 4-6 scale (balanced), and 440 in the 7-9 scale (analytic). This means that Argentine producers consider themselves mostly analytic when making their purchasing decisions for inputs and capital equipment; while a significant number consider themselves balanced, and very few intuitive.

Table 1.
Frequency distribution of Argentine Producers

Decision making for purchasing products	Frequency No. observations	Percent	Cumulative Percent
Extremely Intuitive (1)	2	0.24	0.24
2	12	1.47	1.71
3	21	2.57	4.28
4	40	4.89	9.17
5	178	21.76	30.93
6	125	15.28	46.21
7	155	18.95	65.16
8	168	20.54	85.70
Extremely Analytical (9)	117	14.30	100.00
Total	818	100	

Analytic, balanced and intuitive producers differ in many aspects, such as in their socio demographic profiles, size of farming operations and land ownership, and willingness to take risk and to invest, as we will describe in Table 2.

Analytic producers operate larger extensions of land (2851 hectares) and also have the largest sales among the three segments. These producers have an undergraduate college degree mostly oriented to natural sciences (46.4%), and 7.7% of them have a graduate and/or a postgraduate degree. They are the most willing to take risks in order to have an opportunity to obtain a reward and most willing to invest in the next 5 years (85.7%).

The intuitive producers tend to be the youngest (42.8 years), they are the smallest producers in terms of farming operation size (892 hectares) and sales. A comparatively small number of these producers have an undergraduate college degree (31.4%) and a degree in natural sciences (17.1%), when compared to the other segments of producers. Their willingness to take risks is fairly below average, as well as their willingness to invest in the next 5 years. The balanced producer tends to be the oldest among the Argentine producers (49 years), and tend to own the land they operate (71.4%). Compared to the other segments of producers, their undergraduate education is relatively more oriented to social sciences and economics. Their willingness to take risks is below the average, as well as their willingness to invest in the next 5 years (55.4%).

Table 2.
Descriptive Statistics of Argentine Producers according to cognitive styles

Variable	Intuitive	Balanced	Analytical	Total
	Mean	Mean	Mean	Mean
Age (years)	42.8	49.0	43.5	45.8
Size (hectares)	892	1423	2851	2168
Sales (> US$ 1,000,000, %)	3%	20%	32%	26%
Ownership of land (%)	45.7%	71.4%	47.7%	57.6%
Undergraduate University Degree (%)	31.4%	53.6%	55.2%	53.6%
- In Natural Sc.(%)	*17.1%*	*28.3%*	*46.4%*	*37.5%*
- In Economics Sc.(%)	*8.5%*	*13.1%*	*5.0%*	*8.6%*
- In Social Sc.(%)	*2.9%*	*10.8%*	*2.2%*	*5.9%*
- In Engineering (%)	*2.9%*	*1.4%*	*1.6%*	*1.6%*
Graduate/ postgraduate degree (%)	0.0%	7.3%	7.7%	7.2%
Willingness to take Risks*	5.94	5.66	6.33	6.03
Willingness to invest in 5 years (%)	54.3%	55.4%	85.7%	71.6%
Observations	**35**	**343**	**440**	**818**

*scale from 1 to 9, 1 means not willing, and 9 means really willing to take risks

In summary, we have three types of producers with distinctive profiles. The analytic producer is well educated in natural sciences at university level, manages large farming operations, has relatively large sales, and is willing to take risks and invest. The intuitive producer is the youngest, manages relatively small farming operations, earns lower incomes, is the less educated in terms of college degree, and his willingness to take risks and invest is below the average producer. Finally, we have the balanced producer, who is the oldest, tends to own the land on which he operates, his university level education is comparatively more oriented to social sciences and economics than the other segments of producers, and his willingness to risk and invest in the future is relatively lower than the average producer.

4.2 Purchasing Behavior Results

4.2.1 Product Attributes

Here the producers were asked how they rank three attributes of inputs: Price, product performance and supplier relationship for the cases of seeds, inoculants, crop protection, fertilizers, and capital equipment. We can see the results in Table 3.

The results we observe show that producers, as an average, rank the attribute 'product performance' relatively higher than 'price', and 'price' higher than 'supplier relationship' for seeds and capital equipment. As well as for crop protection, although the value difference between 'performance' and 'price' is negligible. For inoculants and fertilizers, the attribute 'price' is ranked higher than 'product performance'. For all types of inputs, 'supplier relationship' is the least valued attribute, compared to 'product performance' and 'price'.

Now, considering how producers value the products' attribute according to their cognitive styles (analytic, balanced and intuitive), the results are not homogeneous. The results show that analytical producers rank the attribute 'product performance' higher than balanced and intuitive producers, for all the categories of inputs except capital equipment. And for capital equipment, analytical producers tend to rank the attribute 'price' relatively higher than balanced producers. In all cases, the analytical producer is the one who ranks the attribute 'supplier relationship' at the lowest level. We did not find statistical differences in how producers value the attribute 'price' (except for capital equipment), which means that producers in all segments consider this factor equally important.

Table 3.
Product Attributes
Product attributes ranking in order of importance: Price, Product Performance, and Supplier Relationship
(Scale of 1 to 3. With 1 as the most important, and 2 or 3 the least important)

Product	Attribute	Intuitive	Balanced	Analytic	Total	Observations	ANOVA test (p-value)	Pairwise-comparison test
Seeds	Price	1.89	1.90	1.94	1.92	814	0.584	
	Performance	1.86	1.73	1.47	1.59	814	0.000	Analytic is different from the others.
	Relationship	2.26	2.38	2.59	2.49	814	0.000	Analytic is different from the others.
Inoculants	Price	1.89	1.67	1.73	1.71	813	0.208	
	Performance	1.97	1.99	1.70	1.84	813	0.000	Analytic is different from the others.
	Relationship	2.14	2.34	2.57	2.45	813	0.000	Analytic is different from the others.
Crop Protection	Price	1.80	1.73	1.81	1.77	814	0.232	
	Performance	2.03	1.91	1.59	1.74	814	0.000	Analytic is different from the others.
	Relationship	2.17	2.37	2.60	2.48	814	0.000	Analytic is different from the others.
Fertilizers	Price	1.86	1.65	1.65	1.66	813	0.256	
	Performance	1.94	1.98	1.76	1.86	813	0.000	Analytic different from the others
	Relationship	2.20	2.37	2.59	2.48	813	0.000	Analytic is different from the others.
Capital Equipment	Price	2.17	2.20	1.99	2.09	813	0.000	Analytic is different from balanced.
	Performance	1.71	1.57	1.58	1.58	813	0.489	
	Relationship	2.11	2.23	2.44	2.34	813	0.002	Analytic is different from the others.

Note: Pairwise comparison test with Bonferroni correction, α=0.1

*** p<0.01, ** p<0.05, * p<0.1

Tables 4.1 and 4.2.
Brand loyalty and loyalty to dealers/retailers

Table. 4.1.
Producers' loyalty to product brands (in %) by decision making style

Product	Intuitive	Balanced	Analytic	Total	Observations	ANOVA test (p-value)		Pairwise comparison test
Seeds	20.00	17.46	26.49	22.35	792	0.015	**	Analytic is different from balanced
Capital Equipment	11.76	14.67	12.76	13.52	799	0.712		
Crop Protection	11.43	2.06	5.16	4.10	781	0.008	***	Balanced and intuitive are different
Fertilizers	2.94	2.96	3.29	3.14	797	0.963		
Inoculants	5.71	1.78	3.00	2.61	805	0.286		

Note: Pairwise comparison test with Bonferroni correction, α=0.1

Table 4.2.
Producers' loyalty to dealers/retailers (in %) by decision making style

Product	Intuitive	Balanced	Analytic	Total	Observations	ANOVA test (p-value)		Pairwise comparison test
Seeds	20.59	11.44	20.19	16.43	791	0.004	***	Analytic is different from balanced
Capital Equipment	8.57	8.5	13.15	10.97	802	0.115		
Crop Protection	8.57	3.83	10.84	7.73	789	0.001	***	Analytic is different from balanced
Fertilizers	2.94	3.8	5.69	4.76	798	0.419		
Inoculants	2.86	2.64	5.31	4.08	809	0.163		

Note: Pairwise comparison test with Bonferroni correction, α=0.1

*** p<0.01, ** p<0.05, * p<0.1

4.2.2 Producers' Loyalty to Brands and Dealers/Retailers

Producers were asked how loyal they are to brands and to dealers/retailers. We define brand loyalty of a producer as a combination of his willingness to do more business with the brand he actually purchases, his endorsement of the brand among his neighbors, and his intention of not changing brands even if prices go up more than 10%. Results are in Tables 4.1. and 4.2.

Producers' brand loyalty, as an average, is relatively high for seeds (22.3%) and for capital equipment (13.5%); and it is relatively low for crop protection (4.1%), fertilizers (3.1%), and for inoculants (2.6%). However, analytic producers tend to be more brand loyal for seeds (26.5%) than balanced producers (17.5%), and intuitive producers are more brand loyal for crop protection (11.4%) than balanced producers (2.1%).

We define producers' dealer/retailer loyalty in analog terms as we defined brand loyalty: a producer is loyal to a dealer/retailer if he is intending to do more business with his dealer/retailer, he endorses the dealer/retailer among his neighbors, and he declares that he will not change dealer/retailer even if the dealer's prices go up more than 10%.

In this case, as we can see in Table 4.2, the average producer responded similarly as he did in the case of brand loyalty: Producers tend to be relatively loyal to the dealer/retailer for seeds (16.4%) and capital equipment (10.9%), and relatively non-loyal for the cases of crop protection (7.7%), fertilizers (4.8%), and inoculants (4.1%). However, we observe that analytic producers are more loyal to the dealer/retailer than balanced producers for the cases of seeds and crop protection.

4.2.3 Producers' Relationship with Dealers/Retailers

Here we asked two questions. The first is if the producer has changed a major supplier of an important product for his farm in the past five years, specifying why he left the dealer/retailer. Almost 70% of the producers declared that they have not changed major suppliers of an important input for their farm in the past five years. Analytic producers tend to change major suppliers more often than balanced and intuitive producers. These results are presented in Table 5.1.

The major reasons that lead producers to change suppliers are the following: because they do not have the products they need (17.6%), because they charge high prices (12.6%), because of service problems (9.9%), and because they do not provide financing (9.4%). Analytic producers tend to weigh these reasons higher than balanced producers, and are also different than intuitive producers in the case of high prices.

In the second question (Table 5.2.) we ask producers to rank the most important factors in their selection of dealers/retailers, in a scale from 1 to 8, where 1 is 'the most important' and 8 is 'the least important'. On average, the producers responded that the most important factor in this selection is obtaining financing (3.5), followed by quality of services (3.6), availability of multiple brands (3.8), and the availability of services (3.9). The factors that appear less relevant are return of products and warranties (6.0), past experience (5.4), the relationship with the salesperson (4.9), and technical advice (4.7).

Analytic producers have a different purchasing behavior than balanced producers regarding the importance of the selection factors of dealers/retailers. They differ in their ranking in four of the most relevant selection factors: The analytic values 'financing', 'service quality' and 'availability of services' relatively higher; while balanced producers value 'available multiple brands' relatively higher. For 'financing', even if the analytic producer ranks this factor higher than the balanced producers, the intuitive is the one who values it the highest.

We conclude that analytic and balanced producers differ in their relationship with dealers/retailers, as analytic producers tend to change suppliers more frequently, they place different weight on major reasons to change suppliers, and they rank the major factors for selecting dealers differently.

4.2.4 Producers' Relationship with Salespeople

We asked producers which are the most frequent situations that drive them to contact the salesperson. They could select up to three answers. The most important reason is if they need a product (85%), followed by if they need price (67%), if they need non-price information (48%), and finally if they have a problem (35%). We can observe the results in Table 6.1.

When producers respond that they contact a salesperson 'if they need a product', we find significant statistical differences between analytic and balance producers, as the latter values this reason more than the former. When producers respond 'I need non-price information', analytic (45.0%), balanced (55.4%) and intuitive producers (22.9%) differ significantly in their response. Finally, analytic (42.0%) and balanced producers (26.5%) also have significant differences regarding the response to 'when I have a problem'.

We also asked if a salesperson (whom the producer does not currently buy from) asks him to meet, what factors would make him want to do so (see Table 6.2.). The most important factor is if the producer knows and respects the salesperson (55.3%), followed by if the salesperson has a product or an idea that the producers has not yet heard of (51.6%), if the salesperson states a clear reason for an appointment (33.5%), and if he has a good price deal on something the producer is already buying (31.5%). For the four most important factors there are significant differences between analytic and balanced producers, and in one case ('I know and respect the salesperson') there are significant differences between the three groups of producers.

In summary, the most frequent situation that drives producers to contact a salesperson is 'when I need a product', followed by 'when I need price'. Now, if we compare the cognitive style segments, the analytic producers place a relative higher value to contact a salesperson when he has a problem, the balanced producer when he needs price and when he needs non-price information, and the intuitive producer when he needs a product. Regarding the factors that make them willing to meet with salespeople, analytic producers tend to place higher weight on agreeing to meet than balanced producers when there is a clear reason for an appointment and when the salesperson offers a good price deal.

Tables 5.1 and 5.2.
Producers' relationship with dealers/retailers

Table 5.1.
Reasons for changing major supplier of inputs (In %, multiple answers, more than 100% response)

Reasons	Intuitive	Balanced	Analytic	Total	Selected answers	ANOVA test (p-value)		Pairwise comparison test
I have not changed any of my main suppliers	77.10	79.60	61.10	69.60	569	0.000	***	Analytic is different from balanced
I have changed because they did not have the products I need	14.30	12.50	21.80	17.60	144	0.002	***	Analytic is different from balanced
I have changed because of high prices	2.90	6.70	18.00	12.60	103	0.000	***	Analytic is different from balanced/intuitive
I have changed because of service problems	11.40	5.00	13.60	9.90	81	0.000	***	Analytic is different from balanced
I have changed because it did not provide financing	8.60	6.40	11.80	9.40	77	0.036	**	Analytic is different from balanced
Observations	35	343	440	818				

Note: Pairwise comparison test with Bonferroni correction, α=0.1
*** p<0.01, ** p<0.05, * p<0.1

Table 5.2.
Factors in the selection of dealers/retailers (Rank from 1 to 8, where 1 is "the most important" and 8 is "the least important")

Reasons	Intuitive	Balanced	Analytic	Total	ANOVA test (p-value)		Pairwise comparison test
Financing	3.20	3.75	3.31	3.49	0.019	**	Analytic and balanced are different
Quality of the service provided	4.11	3.96	3.38	3.66	0.000	***	Analytic and balanced are different
Availability of multiple brands	4.17	3.36	4.11	3.80	0.000	***	Analytic and balanced are different
Availability of the service (delivery, etc.)	4.00	4.15	3.82	3.96	0.067	*	Analytic and balanced are different
Technical advice	4.20	4.57	4.90	4.73	0.039	**	Not enough power to reject H_0
Relationship- The relations with the seller	4.80	5.01	4.86	4.92	0.626		
Past experience	5.49	5.26	5.54	5.42	0.194		
Return of the product and guarantees	6.03	5.95	6.09	6.03	0.609		
Observations	35	343	440	818			

Note: Pairwise comparison test with Bonferroni correction, α=0.1, *** p<0.01, ** p<0.05, * p<0.1

Tables 6.1 and 6.2.
Producers' relationship with salespeople

Table 6.1.
Most frequent situations that drive producers to contact a salesperson. (In %, up to 3 reasons, multiple answers, more than 100% response)

Reasons	Intuitive	Balanced	Analytic	Total	ANOVA test (p-value)		Pairwise comparison test
When I need a product	91.40	88.60	82.50	85.50	0.032	**	Analytic is different from balanced
When I need price	62.90	71.10	64.80	67.40	0.144		
When I need non-price information	22.90	55.40	45.00	48.40	0.000	***	All groups are different from each other
When I have a problem	25.70	26.50	42.00	34.80	0.000	***	Analytic is different from balanced
Observations	35	343	440	818			

Note: Pairwise comparison test with Bonferroni correction, α=0.1 *** p<0.01, ** p<0.05, * p<0.1

Table 6.2.
Factors that lead a producer to meet with a salesperson. (In %, multiple answers, more than 100% response).

Factors	Intuitive	Balanced	Analytic	Total	Selected answers	ANOVA (p-value)		Pairwise comparison test
If you know and respect the salesperson	31.40	58.90	54.30	55.30	452	0.006	***	Intuitive different balanced/analytic
If the salesperson has a new product/idea	37.10	49.00	54.80	51.60	422	0.059	*	Not enough power to reject H_0
If the salesperson states a clear reason for an appointment	22.90	27.40	39.10	33.50	274	0.001	***	Analytic is different from balanced
If the salesperson says he has a good price deal	31.40	22.40	38.60	31.50	258	0.000	***	Analytic is different from balanced
If someone whose opinion you value referred them to you	28.60	31.50	30.00	30.60	250	0.874		
If the salesperson has asked several times to meet	22.90	14.00	17.70	16.40	134	0.215		
If the company has made mistakes	14.30	14.90	15.90	15.40	126	0.907		
Observations	35	343	440	818				

Note: Pairwise comparison test with Bonferroni correction, α=0.1 *** p<0.01, ** p<0.05, * p<0.1

5 Summary and Conclusions

Responding to the goal of this paper, the question if producers with different cognitive styles have diverse purchasing behaviors when buying inputs for their farming operations, the statistical results we obtained show us that different segments of producers have distinctive purchasing behaviors.

As a brief summary, we can say that analytic producers tend to focus more on product performance and less on the relationship with suppliers when buying their inputs. They also tend to be loyal to input brands, they rely less on dealers/retailers and salespeople, and they are willing to change suppliers more often than other producers. Intuitive-oriented producers value more the relationship with the supplier and are interested in contacting the salesperson if they need a product. While balanced-oriented producers declare to be less loyal to brands but are more stable in terms of not changing input suppliers frequently.

Based on the results, we can ask why are there so many statistical differences between analytic and balanced producers in terms of their purchasing behavior, and not so much with intuitive producers. The small number of observations in the intuitive-oriented segment makes it difficult to reject the null hypothesis that this group is not different from the other two, even if ANOVA tests are significant to reject the null hypotheses. The Bonferroni Pairwise comparison test requires big differences between mean values when there are small samples; such is the case for the intuitive-oriented producers' segment, with only 35 individuals. In some situations, the difference in means may not be large enough to compensate the small sample numbers[4]. In this sense, we believe that balanced producers, who are in the middle of the style distribution, include more characteristics from intuitive cognitive style; for which it may be included into the broader category of intuitive-oriented producers. To facilitate the interpretation of the results, we will use the analytic-oriented producers as benchmark category and compare it with a more generic intuitive-oriented type of producer, composed by intuitive and balanced-oriented producers.

The results we obtained confirm the first hypothesis that analytic-oriented producers tend to rank higher 'product performance' than intuitive-oriented producers, for all types of agricultural inputs (seeds, inoculants, crop protection and fertilizers), except for capital equipment. The probable explanation we find for this is that capital equipment products have other relevant attributes (besides price, performance and supplier relationship), such as support services, which may lead the producer to choose a certain capital equipment product. Support services have been defined as the ones related to whether the capital equipment dealer offers delivery, repair, and application services (Roucan-Kane et al. 2011). Results obtained by Roucan-Kane (2011), Burgert (2011) and Feeney (2012) for capital equipment sold in the US and Argentina show that support services have an average weight of 13-15% of the total purchasing factors. This would explain why performance alone would not be the only distinctive factor which would make analytic-oriented buyers to decide purchasing capital equipment: other dimensions, such as support services, have to be considered too.

The results also support the idea expressed in the second hypothesis, that analytic-oriented producers tend to rank lower 'supplier relationship' than intuitive-oriented producers. The latter rely more on the advice of a supplier to ensure a good quality of the purchase while the former devote more time and effort to evaluate 'product performance' rather than on the advice of the dealer.

We also can observe from the results that for performance-oriented products (which are more complex to evaluate) such as capital equipment, there are no significant differences in brand/dealer loyalty between analytic and intuitive-orient producers, as it is shown in Tables 4.1 and 4.2. This is true for capital equipment; for seeds, however, we observe differences between analytic and balanced-oriented producers. The possible explanation we find is that producers rely on a selection of brands/dealers which they consider to be the most reliable among which they will make their choices, evaluating the product with the best technical performance. If the seed-product is really technically good, the analytic-oriented producer will be loyal to the brand/dealer,

[4] The Bonferroni Pairwise comparison will reject the null hypotheses (there is no difference between two groups) only if the differences in the means between both groups is higher than a coefficient that depends directly on the value of the t distribution and the pooled standard deviation, and inversely on the sample sizes of both groups. For lower sample sizes, higher differences in means is required (Oehlert, 2010).

even if prices go up more than 10%, as we explained in the method section. This commitment to 'performance' in seeds is not as strong for more intuitive-oriented producers, in particular balanced producers, as we can see in Table 3, which would explain differences in brand/dealer loyalty for seeds.

The last hypothesis is that analytic-oriented producers will rely less on dealers/retailers and on salespeople to select their products than intuitive-oriented producers. The results in tables 5.1 and 6.1 and 6.2 show that analytic-oriented producers:

1) Change more often main suppliers than other producers (Table 5.1);
2) They are less willing to contact a salesperson in case 'they need a product' than intuitive and balanced-oriented producers (Table 6.1);
3) They would meet a salesperson only if they already know and respect the salesperson (Table 6.2).

For the three cases pointed out above, analytic producers show significant differences compared to more intuitive-oriented producers: in the first two cases regarding balanced-oriented producers, and for the third case versus the rest of the producers. These facts show that analytic producers tend to rely less on the relation with their suppliers, focusing more on other aspects of the commercial relation, such as quality, performance or brand.

The profile of the analytic producer is especially interesting due to his relatively high brand loyalty for seeds; and his loyalty towards retailers, not only in seeds but also in crop protection. For most inputs, except capital equipment, analytic producers are the ones who value most 'product performance', and least 'supplier relationship'. The analytic producer also has clear and differentiated criteria to select the suppliers for his major products and in the reasons that lead him to contact and meet with salespeople. The main characteristics of analytic producers are summarized in table 7.

Table 7.
Analytic producer s' main characteristics

Dimension	Main findings
Product characteristics	He is more interested in the attributes of the product itself, especially performance, than in the relationship with the supplier.
Brand Loyalty	He tends to be loyal to seed brands, and to seed and crop protection retailers.
Relationship with dealer/retailer	He tends to change suppliers more frequently than the average producer. When selecting dealers/retailers, he is interested in the availability and quality of the service provided by the supplier.
Salesperson	He contacts a salesperson when he has a problem and if the salesperson has something interesting to offer him. The factors that lead him to meet a salesperson are if the salesperson has a new product/idea and if he offers a good price deal.

In terms of input suppliers, it is important to identify and give special attention to analytic-oriented producers, since this type of client is the most demanding in term of quality and product performance; and they are also inclined to change their supplier if necessary. In particular, since they prefer to maintain the relationship with the salesperson as low as possible, it is important for suppliers to design mechanisms to approach to this type of customers and retain them. For example, field days and agricultural expositions or technical demonstrations seem to be better ways to establish long-term relationship with analytic-oriented producers.

This characterization of producers has important business implications: Identifying and segmenting the different types of producers with different cognitive styles and distinctive buying profiles is a key aspect of the strategic marketing plan of any company in the input markets. We have shown in this paper that Argentine producers with different cognitive styles have diverse purchasing behaviors. These different types of producers can be identified, and this can lead to provide better services especially designed for each segment, which could render higher profits for the input company.

To our knowledge, this is the first paper on the topic of cognitive styles of Argentine producers and their impact on their purchasing behaviors. As such, it is a preliminary paper: it is a statistical descriptive study based on a large survey of Argentine producers, and a self-report assessment instrument applied to a specific farming context. As this is a non-conditional statistical study, we cannot reject the possibility that the differences in purchasing behavior can be explained by other variables different from cognitive styles. Further research could go to analyze the topic more deeply using more specific methodological tools; and to study other related topics such as the impact of cognitive styles on producers' strategic decisions, cognitive styles and environment decisions, and cognitive styles and organic production, among others.

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