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ON SOME FEATURES OF DETECTING CONCORDANCE IN MONOZYGOTIC (MZ) TWINS

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მონოზიგოტურ (MZ) ტყუპებში კონკორდანტობის გამოვლენის ზოგიერთი თავისებურების შესახებ

თსსუ, სამედიცინო ბიოლოგიისა და პარაზიტოლოგიის დეპარტამენტი

რეზიუმე

ამ ნაშრომში ჩვენ შევეცადეთ გაგვეანალიზებინა და ერთმანეთისათვის შეგვედარებინა ბუნებრივი გზით და საკეისრო კვეთით დაბადებული MZ ტყუპისცალების მიერ შესრულებული ნახატები. აღსანიშნავია ის გარემოება, რომ ისინი ნახატებს ქმნიდნენ ერთსა და იმავე დროის მონაკვეთში და თანაც თითოეულმა ტყუპისცალმა არ იცოდა, თუ რას ხატავდა სხვა ტერიტორიაზე მყოფი მეორე ტყუპისცალი. მიღებული შედეგებიდან გამომდინარე, ჩვენ მივედით იმ დასკვნამდე, რომ როგორც ბუნებრივი გზით, ისე საკეისრო კვეთით დაბადებული MZ ტყუპისცალების მიერ შესრულებული ნახატების კონკორდანტობა საკმაოდ მაღალი იყო, რაც მიუთითებს იმაზე, რომ ადამიანში გარკვეული სახის უნარები ჯერ კიდევ დაბადებამდე არის დეტერმინირებული ჩვენს ორგანიზმში. აქვე გვინდა აღვნიშნოთ, რომ MZ ტყუპებში მეორე ტყუპისცალი უფრო მეტად გახლდათ დეტალების ხატვისადმი ორიენტირებული, ვიდრე პირველი. აქ წარმოდგენილი საკითხების კიდევ უფრო სიღრმისეულად გაანალიზების მიზნით ვფიქრობთ საინტერესო იქნება ჩვენს მიერ მოპოვებული მონაცემების დამუშავება ხელოვნური ინტელექტის გამოყენებით.

If you want a better life, what would you change first? Almost no one would say „my genes". And with good reason, we`ve been taught that genes are fixed and unchangeable. If you happen to be an identical twin, both of you will have to settle for identical genes, no matter how good or bad they are [1]. But identical twins, despite being born with the same genes, show extremely different gene expression as adults. One twin may be obese, the other lean; one may be schizophrenic and the other not; one may die long before the other. All of these differences are regulated by gene activity [1]. At the same time, team led by Dr. Jeffrey Craig in 2010 investigated a few relatively small regions of the genome in greater detail using samples just from newborn twin pairs, they showed MZ twins differed in their DNA methylation patterns, suggesting identical twins begin to diverge epigenetically during development in the uterus and we can conclude that even genetically identical individuals are epigenetically distinct by the time of birth, and these epigenetic differences become more pronounced with age and exposure to different environments [2].

Beside of Epigenetic and Environmental factors there are some factors contributing to differences in MZ twins too. Post-zygotic changes:

- Chromosomal mosaicism: After the initial split, further division can create cells with slightly different chromosome arrangements.
- X-inactivation: In females, one X chromosome is inactivated. This process can be skewed, leading to differences in gene expression.
- Imprinting: Certain genes are expressed based on whether they are inherited from the mother or the father. These imprinted genes can be differentially expressed in MZ twins [3].

Our study aimed to determine the dynamics of changes in skills such as drawing and handwriting between MZ twins born naturally and MZ twins born by cesarean section [4,5,6]. As concern drawings,

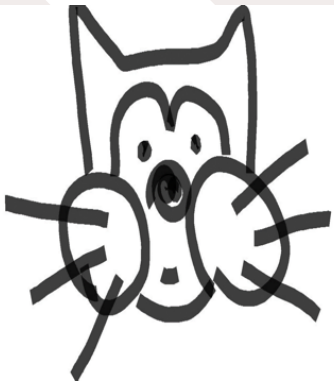
we gave the MZ twins such an assignment to draw a picture without telling each other in advance. Moreover, at our request, we placed several MZ twins in different rooms and asked them to draw any picture for a certain amount of time.

Case (1) Natural birth. Our attention was drawn to the content of these drawings. When the first-born twin drew clouds and wrote that it would rain soon, the other twin, sitting in the other room, continued this thought not by writing, but by drawing directly and drew the rain that had come. Here we want to point out that when we assume that something similar could have been done by the firstborn twin, if he had drawn the clouds first. We showed these drawings to several Georgian artists and asked them which twin's drawing was better. They gave preference to the first-born twin. Nevertheless, we still considered that the second-born twin had a slightly more imaginative mind than the first, as there was more variety in his drawing.

First-born

Second-born

Case (2). After two Georgian identical twins drew us a picture in a short period during an online conference. They fulfilled our request and sent us these two pictures. It is worth noting that during the drawing process, they were in different areas and did not know what their identical twin was going to draw. We offer you the drawings they made.



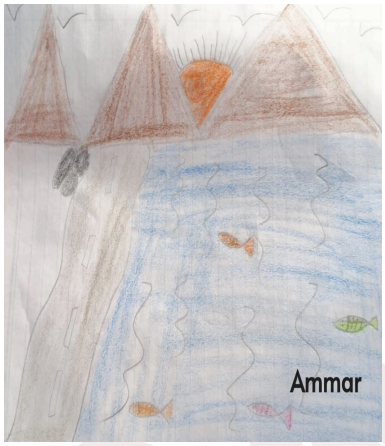
First-born

Second-born

It was interesting to note that later, the second twin told us that he was also going to draw a cat, but at the last moment, he changed his mind and drew a caricature of a man. In our opinion, in this case, the second twin's drawing leaves a better impression, although the first twin's choice is not wrong either. But the main question is why the second twin wanted to draw a cat in the first place. Is the so-called "competitive gene" mentioned in our previous work at work? [4].

Case (3). Pictures of MZ twins born by cesarean section are already presented here.

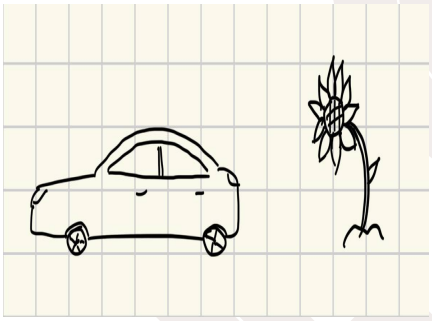
First-born



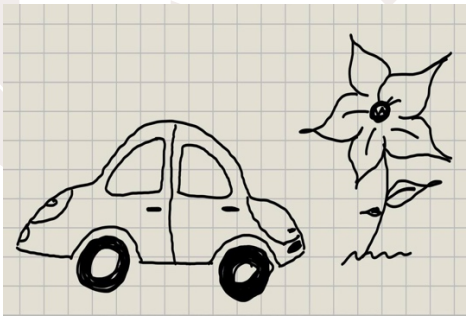
Second-born

As can be seen from these images, there are many similar elements in the drawings of both twins; however, in our opinion, although the drawing of the second twin is more interesting in terms of content, the drawing of the first-born twin still looks more impressive.

Case (4). This case also presents drawings of MZ twins born by cesarean section.

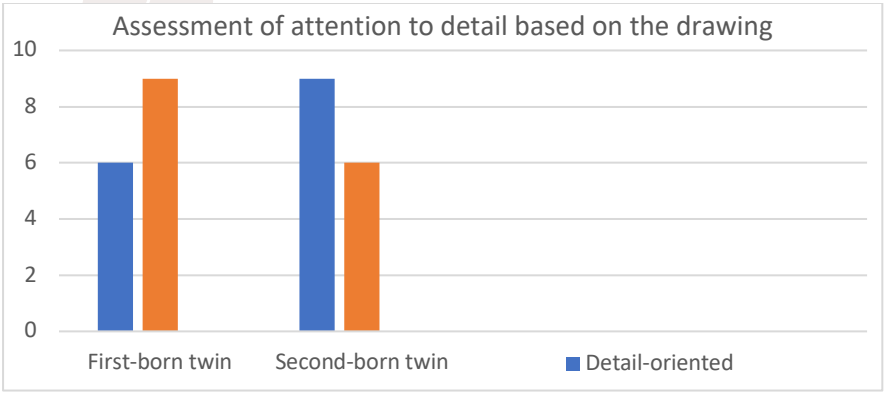


First-born



Second-born

In these images, there is also a great deal of concordance between the drawings of the twins, although the existence of differences is also striking. Our observations showed that the second-born twin was more detail-oriented, which is clearly visible in their drawings. The graph below shows this.



In this paper, we attempted to analyze and compare the drawings made by MZ twins, who were born naturally and by cesarean section. It is noteworthy that they created the paintings at the same time, and each twin did not know what the other twin, who was in a different area, was painting. Based on the results obtained, we came to the conclusion that the concordance of drawings made by MZ twins, both naturally and by cesarean section, was quite high. This indicates that certain skills in humans are determined in our bodies even before birth. We would also like to note that in MZ twins, the second twin was more oriented towards drawing details than the first. In order to conduct a more in-depth analysis of the issues presented here, we believe it would be interesting to process the data we have collected using artificial intelligence.

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SUMMARY

In this paper, we attempted to analyze and compare the drawings made by MZ twins, who were born naturally and by cesarean section. It is noteworthy that they created the paintings at the same time, and each twin did not know what the other twin, who was in a different area, was painting. Based on the results obtained, we came to the conclusion that the concordance of drawings made by MZ twins, both naturally and by cesarean section, was quite high. This indicates that certain skills in humans are determined in our bodies even before birth. We would also like to note that in MZ twins, the second twin was more oriented towards drawing details than the first. In order to conduct a more in-depth analysis of the issues presented here, we believe it would be interesting to process the data we have collected using artificial intelligence.

Keywords: monozygotic twins, concordance, features