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COMPETITIVE "GENE" IN TWINS

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Doi: <https://doi.org/10.52340/jecm.2025.02.21>

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შეჯიბრებითობის „გენი“ ტყუპებში

თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, სამედიცინო ბიოლოგიისა და პარაზიტოლოგიის დეპარტამენტი, თბილისი, საქართველო

რეზიუმე

ჩვენი აზრით, არსებობს მთელი რიგი განსხვავებების კასკადი როგორც იდენტურ, ისე არაიდენტურ ტყუპებში, მათ ტყუპისცალებს შორის. წინა ნაშრომებში ჩვენ შევძელით ზოგიერთ ამ განმასხვავებელ ნიშან-თვისებებზე ყურადღების გამახვილება, ამჯერად კი ჩვენი კვლევა დაეთმო ტყუპისცალების განსხვავებას ხატვისა და კალიგრაფიის მიხედვით, ვნახეთ, რომ ეს განსხვავება მართლაც არსებობს და შესაძლოა საინტერესო აღმოჩნდეს ტყუპების გენეტიკისა და ეპიგენეტიკის სიღრმისეულად კვლევის საქმეში. გარდა ამისა, დავაფიქსირეთ რომ ზოგიერთ ტყუპებში ტყუპისცალებს შორის ერთგვარ შეჯიბრებითობას აქვს ადგილი და ამ თვისებას უფრო მეტად მეორედ დაბადებული ტყუპისცალი ამჟღავნებს პირველი ტყუპისცალის მიმართ, ვიდრე პირიქით.

It is well established that the incidence of monozygotic twins has increased substantially worldwide since 1980, attributable to multiple factors. One significant factor contributing to this rise is the advent and widespread application of *in vitro* fertilization techniques [4,5]. Consequently, it is highly relevant to document and analyze the genetic and epigenetic differences between first-born and second-born twins to enhance our understanding of human genomic characteristics.

The objective of our study was to obtain as much data as possible regarding the differences between both monozygotic and dizygotic twins. We have been working in this field for a considerable time, and we believe that we have documented significant findings [1,2,3]. For example, we determined that twins differ from each other in terms of height, weight, as well as the sequence and arrangement of primary and permanent teeth eruption [2]. In some twins, we identified a fear of dogs expressed by only one twin. Additionally, we discovered a twin presenting with supernumerary nipples [3], among other differences.

The current study aims to draw attention to distinguishing features between twins such as drawing ability and calligraphy. Regarding calligraphy, we have obtained some results (see Picture 1), which demonstrate that while the first and second twins write in English almost identically, the first twin's handwriting in Georgian is noticeably superior. Moreover, the signature made by the first twin in English is clearer and more aesthetically pleasing.

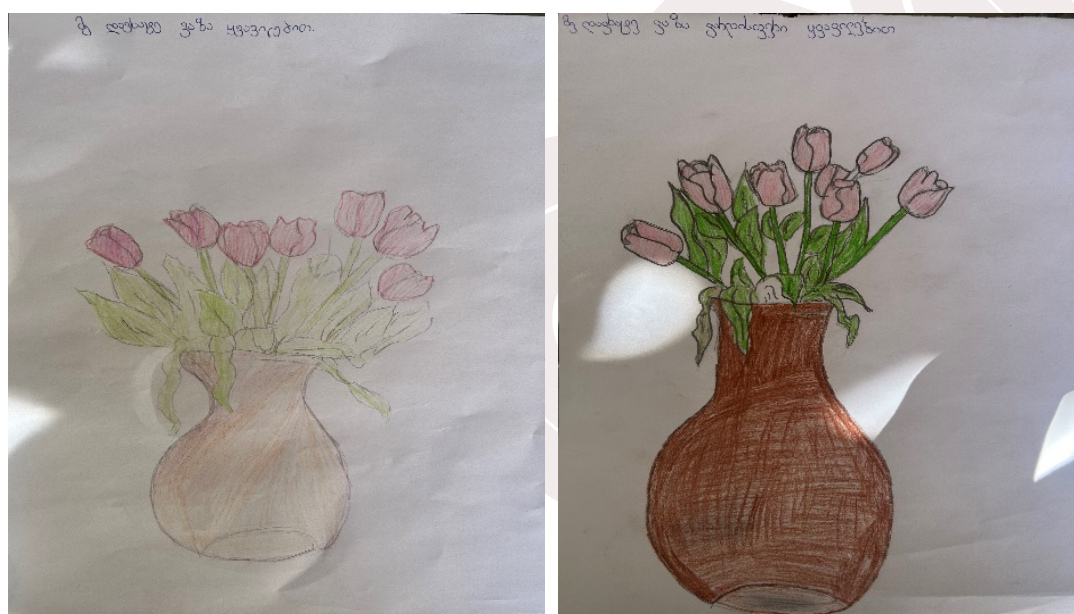
Picture 1. Signatures performed by identical (Indian) twins: the signature above the line was made by the first twin, and the signature below the line was made by the second twin

Handwritten signatures of two identical twins in Georgian and English. The top signature is by the first twin, and the bottom signature is by the second twin. Both signatures are written on a horizontal line.

As a next step, we aimed to evaluate drawing and calligraphy together in order to determine the extent of differences between twins in these areas. Both monozygotic and dizygotic twins participated in our research. The twins were asked to independently draw any image of their choice without any coordination between them. An additional task required them to write a sentence or produce a signature on the same sheet of paper.

We were particularly interested in whether any twin would draw the same picture as their sibling, especially in the case of dizygotic twins. It was found that only one pair of monozygotic twins out of ten produced drawings with the same content (see Picture 2). Notably, the second-born twin preferred to complete the drawing with more vivid colors and added a rather unusual inscription: “I drew a vase with pink flowers,” whereas the first-born twin wrote under their drawing: “I drew a vase with flowers,” although the flowers were in fact pink.

Picture 2. Drawings by identical twins: A – drawing by the first twin; B – drawing by the second twin

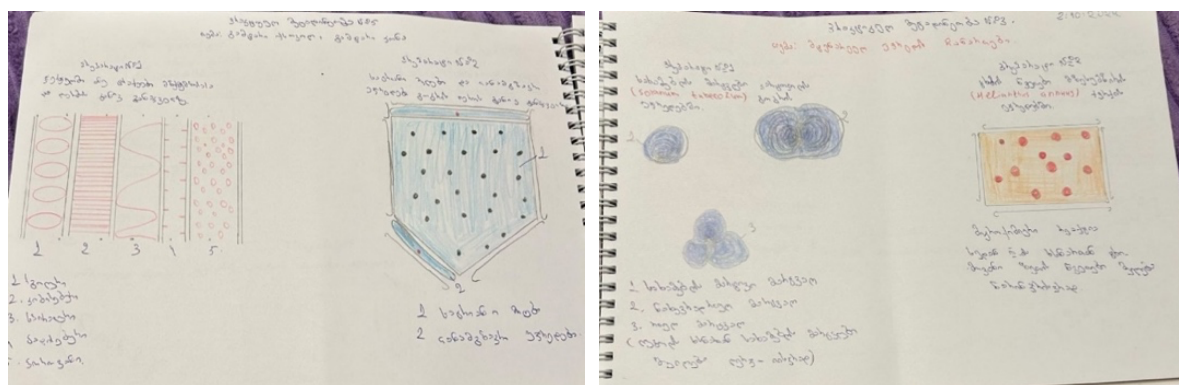


Considering that twins often possess a strong intuitive connection [7], it cannot be ruled out that both twins were somewhat aware of the other’s intended drawing. If this was indeed the case, it reveals a competitive tendency characteristic of the second-born twin towards the first-born twin [6]. This can be interpreted as follows: if you also drew pink flowers and I did too, then my pink flowers are depicted as more vivid and more beautiful—an entirely healthy form of competition between twins. However, this competitive tendency was less pronounced or entirely absent in other monozygotic twins.

Additionally, another interesting detail was observed in this case. Although the handwriting of both twins is very similar, the second-born twin’s penmanship appears slightly inferior. This is particularly evident in the last word of the sentence — “flowers” —where the letters are not aligned on the same baseline.

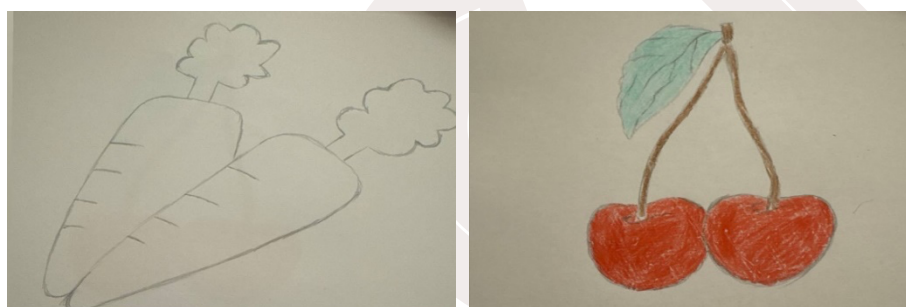
If we consider the second case (see Picture 3), which also presents drawings made by identical twins, we can state that there is no significant difference between the drawings, and the handwriting is almost identical as well.

Picture 3. Drawings by identical twins: A – drawing by the first twin; B – drawing by the second twin

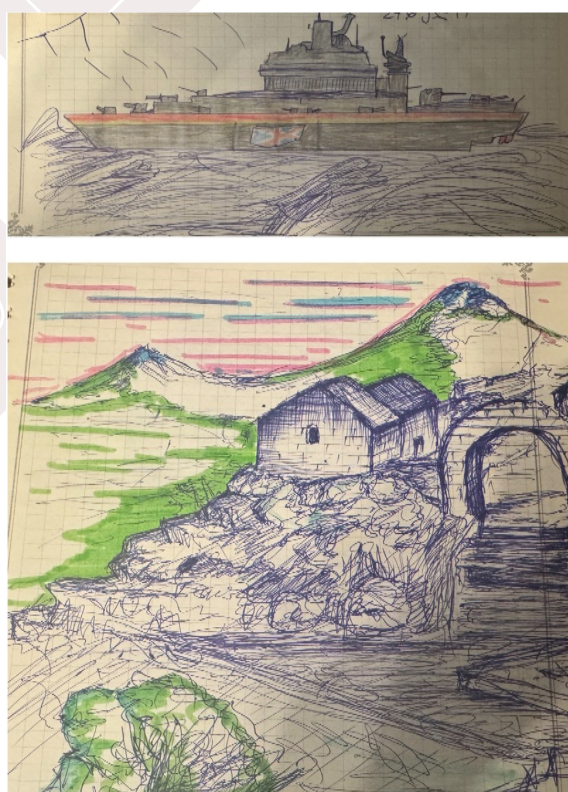


During the analysis of the drawings created by the twins, particular attention was paid to the use of colors by some of the twins. The second-born twin demonstrated a clear advantage, even in terms of color perception (see pictures 4 and 5). The drawings clearly show that in both cases, the second-born twin's artwork is superior, and there is a noticeable preference for bright colors. Conversely, in the case of the first-born twins, the opposite pattern was observed. This phenomenon may have a genetic basis.

Picture 4. Drawings by identical twins: A – drawing by the first twin; B – drawing by the second twin

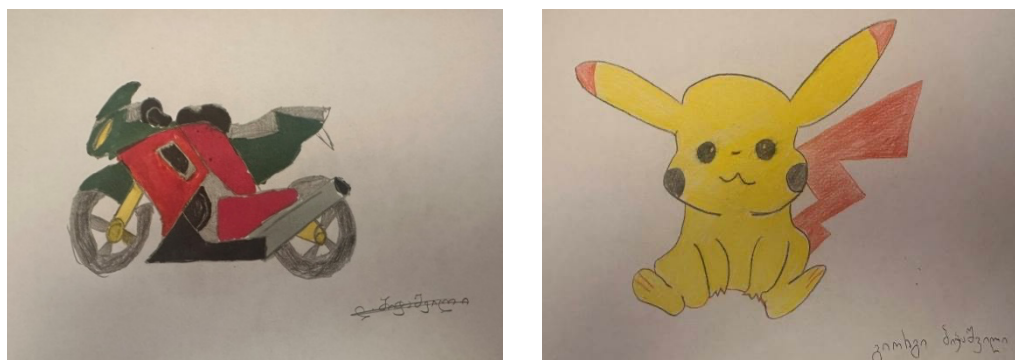


Picture 5. Drawings by identical twins: A – drawing by the first twin; B – drawing by the second twin.



With regard to dizygotic twins, it is noteworthy that no instances of drawings with identical content were observed. Differentiating between twins based on their drawings and handwriting proved considerably more complex. The data suggest that dizygotic twins tend to employ a similar palette of colors in their artwork. As with monozygotic twins, the role of shared genetic factors appears to influence these tendencies.

Picture 6. Drawings by dizygotic twins: A – drawing by the first twin; B – drawing by the second twin



As seen in Picture 6, the first twin's drawing is dominated by black, red, and green hues, whereas the second twin's drawing features primarily yellow, black, and pink colors.

Thus, our study revealed that, based on handwriting analysis, the first-born twin exhibited slightly better calligraphy in a greater number of cases, with an approximate ratio of 2:1. However, we wish to emphasize that drawing premature conclusions in such studies can be somewhat risky. Naturally, it would be desirable to increase the sample size of twins participating in our experiments to enable a more precise analysis of the results. Nevertheless, we believe that in the future, we will be able to establish collaboration with international colleagues working on similar topics, and through joint efforts, achieve significantly improved outcomes.

Finally, we surveyed a substantial number of parents of twins regarding whether the second-born twin exhibited competitive tendencies toward the first-born twin. It was revealed that such a “gene” indeed exists in some twins and is more characteristic of the second-born twin, although it is occasionally observed in the first-born twin as well. Among the 10 monozygotic twin pairs participating in our study, this trait was present in only two pairs. In contrast, among 10 dizygotic twin pairs, we identified the presence of this so-called “competitive gene” in three pairs. Whether such a gene actually exists, which we have provisionally termed the “competitive gene,” remains unknown to us.

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SUMMARY

In our assessment, a series of distinctions exist within the developmental cascade among both monozygotic and dizygotic twins and their co-twins. Previous studies have allowed us to highlight certain differentiating phenotypic traits; however, the present investigation focuses specifically on differences in artistic expression, namely drawing and calligraphy, among twins. Our findings confirm the existence of such differences, which may hold significant implications for the comprehensive study of twin genetics and epigenetics. Furthermore, we documented that a form of intra-pair competitiveness occurs in some twin pairs, with this behavioral tendency being more prominently expressed by the second-born twin in relation to the first-born twin, rather than the converse.

Keywords: twins, gene, competition

