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Introduction: Several factors influence the emotional behavior, including environment, genetic and the interaction between them. **Objective:** The aim of this work is to investigate the interaction between environmental and genetic influences in the divergent behavior of Carioca High and Low Freezing (CHF and CLF) rats - a genetic model to study fear and anxiety. The Carioca rat lines were produced from selective breeding method, from animals with the highest and lowest levels of freezing behavior in the contextual fear conditioning, a model to study anxiety-like behavior. **Methods:** To investigate the gene-environment interplay, we employed the cross-fostering procedure, which CHF rat pups were raised by CLF dams, and vice-versa, since postnatal day (PND) 1 until weaning at PND21. The litters were culled in 8 pups, and we fostered only 2-3 male pups per litter. We also maintained CHF and CLF control, no-fostered litters. On PND60, male animals of the four groups (CHF (n=7), CHF-CLF (CHF pups raised by CLF dams) (n=6), CLF (n=4) and CLF-CHF (n=3)) were exposed to the contextual fear conditioning. **Results:** The freezing behavior on the day after foot shocks was analyzed. A two-way ANOVA showed that, although CHF rats had a higher time in freezing in this task comparing to the CLF ($p < 0.01$), as expected, no one cross-fostering effect was observed: CHF = CHF-CLF > CLF-CHF = CLF. On PND120, the same male rats were exposed to a 12-minutes-session, two-session extinction paradigm, in the same context. In these sessions, no foot shock was used. Comparing the freezing time in the context session on the conditioning paradigm to the freezing time on the first extinction session, we observed a significant decrease in this behavior for the CHF-CLF group, but not in the CHF group ($p < 0.05$). This difference between groups was not observed between CLF and CLF-CHF animals. Our previous work has showed that there isn't a memory deficit in the CHF animals. **Conclusions:** This data suggest an existence of an early environment influence in the anxiety behavior extinction, but it was dependent of the genetic background.