GAYLORD II: A QUALITATIVE ASSESSMENT

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In the process of awarding points, judges look at several elements in gymnast's routines. Among them, the element of risk weighs more heavily now than just a few years ago. Today's gymnasts do not expect to win in international competition by only including in their routines skills of moderate difficulty, even if those skills have been executed with maximum amplitude and expression. To win today the gymnast is required to be inventive and to definitely take more risks than a few years ago. As a result, a plethora of new skills is added constantly to the vast number of existing movements.

Although new skills appear frequently in the gymnastics world, only a few of them win special recognition. By virtue of their originality and risk involved, they are named after their inventors. The Tsukahara vault, the Thomas flairs, the Comaneci uneven bar dismount, the Stalder on the high bar, the Diamidor turn, and many more, are trademark names recognized in the world of gymnastics for being revolutionary high risk movements, at least at their time of invention.

The Gaylord II, named after its inventor, olympian Mitch Gaylord, may be one of the most risky skills on the horizontal bar. It is a release movement in which the gymnast re-grasps the bar after completing a full somersault with a half twist over the high bar (Figure 1). The risk and difficulty involved is obvious and is recognized by the fact that, to our knowledge, no other gymnast has yet executed the skill in competition. Even its inventor did not always include the skill in his routine but attempted it only in crucial high caliber gymnastics meetings, and not always with success.

From a biomechanical perspective, quantitative analysis of a movement is of the utmost importance for providing accurate, detailed, and objective data upon which definite recommendations and conclusions can be made. In absence of quantitative data, however, qualitative information, although not as conclusive, can be valuable in understanding movement. It is the purpose of this paper to provide coaches and athletes preliminary qualitative information regarding the Gaylord II, with the hope that at a later date we will be able to furnish quantitative results.

The subject, Mitch Gaylord, was filmed at the 1985 UCLA NCAA National Championship meeting with a Photosonics 16mm-Biomechanics 500 high speed camera set at 200f/sec. The first attempt at performing the Gaylord II,

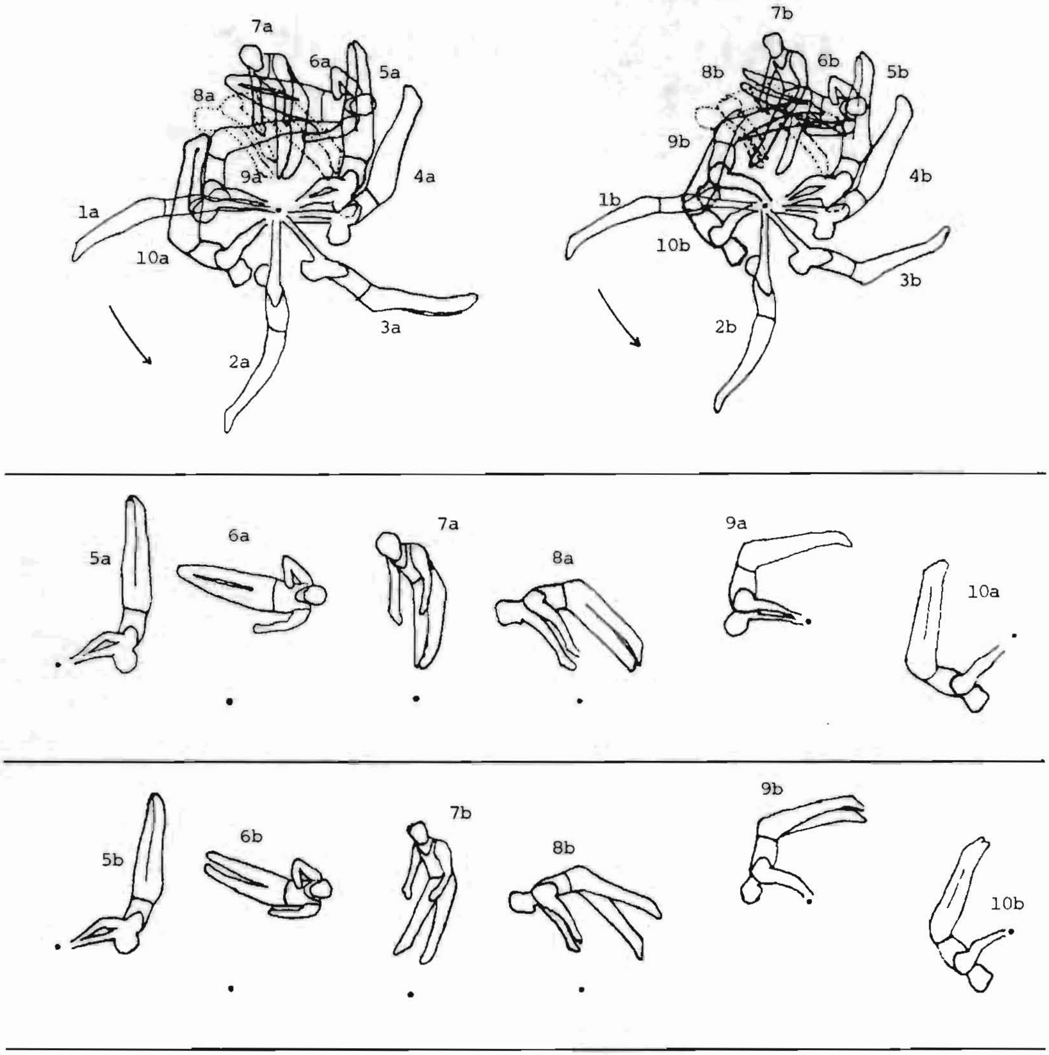

Figure 1. Gaylord II; unsuccessful trial: top left, and first row; successful trial: top right, and second row.

in which the subject barely missed re-grasping the high bar, was executed during the warm-up period of the competition, whereas the second (successful) trial was done during the actual competition. Both trials were recorded on Ektachrome 7251, 400 ASA color film. A Recordak overhead film viewer was utilized to trace the two trials. In addition, a 16mm Lafayette Analyzer System projecting the film onto a rear projection screen (magnification: 75X) was used for qualitative analysis.

Figure 1 presents two dimensional representations of the two performances taken directly from the filmstrip. For comparison purposes, every effort was made to identify and trace the same points of the movement in both trials. Of course, considering the high framing rate, the film's resolution, and some "blurring" at particular points, small tracing errors may have been made. Kinegrams 4a and 5a of the unsuccessful trial depict the gymnast's body configuration at the points at which he just released the first and second hands, respectively. Kinegrams 4b and 5b of the successful performance, represent the subject's body configuration at the same points of the movement as 4a and 5a. Of particular interest are, also, positions 9b and 9a, in which the gymnast re-grasps, or attempts to re-grasp, the bar.

It is known that the trajectory path of a projectile's center of mass (CM) is pre-determined at the instant of release, with angle, height (with respect to landing) and velocity at release being the physical quantities that determine the path of the projectile's CM. Once airborne then, a gymnast cannot alter his CM path, which is influenced only by the gravitational force. To our knowledge, no information regarding the magnitude of the above quantities at any time during the movement exists, so no quantitative comparisons that could conclusively explain the reasons of failure in trial 1 can be made. However, observation of the film and comparison of the kinegrams reveal that the probable cause of failure in the first trial was the fact that the gymnast became completely airborne in the unsuccessful trial at a slightly later moment than in the successful one, altering, thus, the first two parameters, which here are directly related at every moment. In that case, and if we assume that the third parameter, velocity at release, was the same for both trials, the gymnast's CM mass would be further displaced away from the bar at the moment in which the gymnast should re-grasp the bar (position 9a). Theoretically, however, the subject could compensate for small differences in center of mass path. Although once airborne he could not alter his CM trajectory, he could reposition the CM within his body by adjusting the relative position of his different body segments. In turn, this would have created a different "reach" making the effort possibly successful. One, of course, could achieve the desired goal, re-grasping of the bar, by numerous combinations of the involved three physical parameters. It would be of interest and value to investigate and quantify these combinations to precisely predict the conditions under which the skill could be successfully performed every time it is attempted, as well as how small changes in any one, or more, of the parameters would effect the outcome.