

—Bob Feller, Igor Sikorsky agree— The curve ball: yes, it really does

By Charlie Green
(Editor's note: Charlie is a veteran relief pitcher for the Nebraska baseball team and a senior in the School of Journalism. This is a technical report he did for a journalism class.)

Can a human being actually make a baseball curve? Igor Sikorsky, internationally famous expert on aerodynamics, has seemingly ended the century-old dispute with a positive answer.

In the early 1870's, two major controversies stormed in the world of sports. It was California's Gov. Leland Stanford who, in 1873, collected a \$50,000 bet by proving that all four feet of a galloping horse are off the ground at the same time. The other controversy over the curve ball still rages today after nearly a century of scientific debate.

Magazines disagree

Two of the most recent tests of the curve ball dispute were made by two national picture magazines. Each of them used an elaborate photographic technique and the conclusions of both were regarded as authoritative.

Life, in May, 1964, claimed that its studies "raised once more the possibility that this standby of baseball is after all, only an optical illusion." The other, Look, in the same month, insisted "that a curve ball actually does curve."

Ernest Lowry, an outspoken scientist of the optical illusion school, said in Sports Illustrated, "The great injustice of the much publicized curve pitch is that of the manner in which millions of American boys have been misled on the question. They have been forced to delude themselves into thinking that their pitches actually do curve."

Eddie Sawyer, former manager of the Philadelphia Phillies, said in Sport magazine in 1960, "I am not positive whether a ball curves or not, but there is a pitch in baseball much different from the fast ball that separates the men from the boys. If this pitch does not curve it would be well to notify a lot of baseball players who were forced to quit the game they loved because of this pitch, and may now be reached at numerous gas stations, river docks and mental institutions across the country."

Ex-Cincinnati pilot Luke Sewell asked a Life reporter in 1964 a pertinent question: "Isn't it strange that the op-



Nebraska's Keith Winter — one optical illusion coming up.

tical illusion only happens when someone tries to throw a curve ball?"

Feller says yes

Bob Feller, former pitcher for the Cleveland Indians, said in his book "How to Pitch":

"Periodically someone pops up with the old argument that a baseball really doesn't curve — that it is an optical illusion. If this is so, I have struck out a great number of hitters with optical illusions."

Earl Mack, former manager of the Athletics said, when asked about the curve by a Look reporter, "Are these scientific crack-pots crediting pitchers with the power of turning on optical illusions at will?"

Thus the opinion raged on, but without scientific proof. Sikorsky knew little about the game of baseball but he made up for it in scientific knowledge. He realized that a pitched ball traveling in a curved path, is an example of aerodynamic action in everyday life. He realized,

too, that the force which caused a ball to move in flight is the same force known to engineers as the Magnus effect.

Professor G. Magnus of Berlin started research in this field but his subject wasn't baseballs — it was cannon balls. He was trying to find out why German artillery couldn't throw more strikes.

How much stuff?

Sikorsky's first problem was to determine how much "stuff" or spin a pitcher can put on the ball in the regulation 60-foot, six-inch distance from the mound to the plate.

Careful studies were made in New York of rapid-fire flash photographs showing the progress of a single pitch. United Aircraft's technicians, in 1965, experienced in observing the behavior of whirling propellers, examined the change in the position of the ball's stitches from picture to picture.

They figured that the ball was spinning at the rate of 1-3 revolutions during each 1-30 second between expo-

sure. Since the entire pitch took less than 1-12 seconds, the rate of rotation was seen to be about five revolutions for the pitch, or about 600 per minute.

The engineers then knew how much spin a human could put on a pitched baseball but they still had to find out whether that was enough to make it curve.

Wind tunnel test

Using official National and American League balls, Sikorsky put them on a slender spike connected to the shaft of a small motor. During the next "standby time" between aircraft tests, the balls were inserted into a wind tunnel and rotated by the motor at speeds from zero to 1,200 revolutions per minute.

The motor was mounted on a delicately-balanced scale which measured the direction and force of all pressures brought on the balls. The forward speeds of the air moving through the tunnel were varied between 80 and 110 m.p.h., which is about the average speed for a major league pitcher.

To observe maximum and minimum effects, the baseballs were spiked and rotated at two angles. In one position, four seams met the wind during each revolution. This produced the greatest amount of side force on the ball. In the other position only two seams met the wind, producing less friction and less side force.

The wind results were plotted on conventional engineering graph sheets. The results have so much significance that they could cause changes in pitching and batting techniques. These are the four basic Sikorsky conclusions:

Yes, Virginia . . .

1. It can be concluded definitely that a pitched baseball does curve, in addition to any optical illusion that may exist.

2. A pitched baseball travels in a uniformly curved path from the time it leaves the pitcher's hand until it reaches the catcher's glove. There is no such thing as a sharp-breaking curve.

3. To an observer at or behind the plate, it appears that the ball travels fairly straight most of the way and then breaks suddenly and sharply near the plate. Actually the curve ball arcs toward or

away from the plate throughout its flight; but the batter because he views the flight at an angle, cannot discern this.

4. The pitcher who learns to release the ball so that all four seams meet the wind each time it rotates will have the nearest thing to a "Jug-handled" curve. If he can throw a ball over 80 m.p.h. with a spin of 600 revolutions per minute a pitcher can make the ball curve as much as 19 inches.

Sikorsky, then, has concluded that the curve ball does curve but the batter because of his angular view of the pitch, experiences the optical illusion that the ball curves more radically than it does.

Tourney scheduled by Chess League

The first Midwest Intercollegiate Chess Tournament sponsored by the Intercollegiate Chess League of America (ICLA) will be held at the Nebraska Union on April 20-21.

There will be a guaranteed prize fund of \$100 including trophies.

The entry fee will be \$5 and the student must be a member of the United States Chess Federation and a school member of the ICLA, or he may join at the tournament by paying the annual dues of \$10.

Tennis team tips Omaha U., 5-2

The Husker tennis team racked up its second win in as many days as they beat Omaha University 5-2 in Omaha Wednesday.

Bill Fink, Tom Wiese and Bob Hurlbutt each won their singles matches. The Huskers also won both doubles matches while falling in the Nos. 3 and 5 singles.

Bill Roehr, coach Higginbotham's top single man, did not make the trip because of a sprained instep in his foot. Higginbotham is now looking to his first Big Eight encounter next Wednesday with Oklahoma. This match is part of a southern swing by the netmen that includes meets with Oklahoma Baptist and Missouri.

Olympic mat trials set for ISU

Ames, Iowa — The biggest wrestling invasion in its history is possible when Iowa State holds the final Olympic mat trials May 9-14.

Those are the dates that all qualifiers — and possibly a few others — assemble in Ames to get down to the task of making the United States Olympic team. If all district meets were held and all qualifiers arrive at Iowa State, the total could reach 424. Add to this number the men who are outstanding wrestlers but who were unable to qualify for the meet and the total could move up toward the 450 mark.

The latter grouping is possible because a top performer might have been sick or injured, and therefore unable to get to a district meet. It is the intention of the Olympic wrestling committee to have the best men available for the team.

The top two or three men coming from the final trials at Iowa State will report to Adams State in Alamosa, Colo., about three weeks before the Olympic meet in Mexico City. A series of matches at Alamosa will determine the final makeup of the teams which will represent the United States.

Season tickets for the final trials at Iowa State are on sale at the business office in the Athletic Department. Only season tickets, which are the only reserved seats to be sold, are on sale now. The season ticket price is \$10.

Husker Happenings

Thursday
Nothing scheduled.

Friday
Baseball — Kansas, doubleheader at NU diamond, 1 p.m.

Saturday
Baseball — Kansas, NU diamond, 1:30 p.m.

Track — Air Force and Occidental at Colorado Springs.

Golf — at Missouri.

Current Movies

LINCOLN
Cooper/Lincoln: 'Bonnie and Clyde', 7:00, 9:00.
Varsity: 'Blackbeards Ghost', 1:00, 3:00, 5:12, 7:18, 9:24.
State: 'The Graduate', 1:00, 3:00, 5:00, 7:00, 9:00.
Stuart: 'Did You Hear The One About The Traveling Saleslady', 1:20, 3:20, 5:20, 7:20, 9:20.
Joy: 'High Wild And Free', 7:15, 9:15.
Nebraska: 'Stay Away Joe', 1:10, 3:05, 5:05, 7:05, 9:05.
84th & O: 'In The Heat Of The Night', 7:30. 'Duel At Dearlo', 9:25. Last complete show, 9:30.
Starview: Cartoon, 7:30. 'The Glory Stompers', 7:37, 10:50. 'Mary Jane', 9:20.

OMAHA
Indian Hills: 'Gone With The Wind', 8:00.
Dundee: 'Half a Sixpence', 8:00.
Cooper 70: 'Dr. Doolittle', 8:00.

—Second largest indoors— 10th annual rodeo planned for May

The University's 10th annual rodeo, the state's second largest indoors, is being prepared for May 3 and 4 presentations at the State Fair Grounds Coliseum by the University Rodeo Club, according to Tom Cunningham, president.

The yearly event, previously attended by 7,500 or more rodeo enthusiasts, has become a popular area attraction because of the uniqueness of the events and because of its support of the Lancaster County Association for Retarded Children, which receives a portion of total gate.

Such events as the girls pajama game supplement the roping, dogging and riding, all of which are open to entrants who meet general University participation requirements.

Nebraska has much at stake in the upcoming competition, for Chip Whitaker and John Sennett rank first and third respectively in bulldogging in the Great Plains Region, and may qualify for

the national championship finals. Further, all entrants will be vying for over \$1700 of trophies and awards.

The rodeo, the third for the Great Plains Region (Kansas, North and South Dakota, Iowa, Wisconsin and Nebraska), is the primary fund-raising project of the rodeo club, with over 100 active members selling advertisements and promoting the event.

This past year, the club joined the National Intercollegiate Rodeo Association which has boosted the prestige of the rodeo.

The call has now been given for girls of the University to apply as queen candidates. Organized living units or interested individuals are being urged to select their representative who will be generally interviewed April 26, followed by a horsemanship contest April 28. The queen will be crowned May 3 during the first show on Friday evening.

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Coach Devaney pleased with week of spring drills; 1968 gridders ahead of '67 Cornhuskers' progress

Nebraska football coach Bob Devaney surveyed the results of one week of spring drills and smiled.

It was a tip-off that the 1968 Cornhuskers were ahead of the 1967 pace because slow starts were frequent last spring as inexperience slowed the Scarlets.

Asked about the smile, Devaney replied, "You can say our enthusiasm for football this spring is boundless."

Pressed for additional observations about Nebraska's progress, the nation's winningest football mentor said:

Offense improved

"Our offense has shown definite improvement over 1967 and this is an area where we needed to improve."

What about the defense, in view of the fact that All America Wayne Meylan, All Big 8 Jim McCord and two-year starter Jerry Patton have vacated the middle?

"We lost some fine people, all right," Devaney said. "But our defense this spring has shown considerable signs that it will not be as far away as we were afraid it would be prior to spring practice."

As usual a number of spots are still up for grabs, and

it's too early to assign all the starting berths. And injuries have hampered several veterans like halfback Joe Orduna and defensive back Dana Stephenson.

But several candidates like halfback Mike Green, halfback Mickey Ziegler, quarterback Ernie Sigler, quarterback Frank Patrick, fullback Dick Davis, center Carl Ashman, end Tom Penney, guard Joe Armstrong and a host of others have sparked during the early going.

Three-deep lineups going into the second week (drills will end on May 11 with the annual intra-squad game):

Offense

Tight End — Paul Topfiff, Jim McFarland, Bob Logan
Left Tackle — Glenn Paterston, Don McGhee, Bob Grenfell

Left Guard — Dan Delaney, Mel Bricheck, Dennis Ford

Center — Carl Ashman, Joe Buda, Bob Mawhinney

Right Guard — Joe Armstrong, Ben Beland, Ron Volberding

Right Tackle — Ed Hansen, Gale Williams, Wally Win-

ters
Split End — Tom Penney, Rex Lowe, Guy Ingles
Quarterback — Frank Patrick, Ernie Sigler, Tony Dvorsak

Left Halfback — Mike Green, Joe Orduna, Dan Schmiess
Right Halfback — Mick Ziegler, Larry Frost, Paul Rogers

Fullback — Dick Davis, Buster Yannon, Phil Vassar

Defense
Left End — Mike Wynn, Sherwin Jarmon, Dennis Gutzman

Left Tackle — Bob Liggett, Lonnie DeOrio, Mike Burdic

Middle Guard — Bill Hornbacher, Tom Linthroth, Ed Periard

Right Tackle — Ken Kusslerow, Dave Walline, John Hopkins

Right End — Ron Drakulich, Karl Quinten, Jim Miller

Strong Linebacker — Dan Kobza, Jerry Murtaugh, Ervin Haynes

Weak Linebacker — Adrian Filala, Dan Hartman, George Chandler

Fullback — Al Larson, Wilfred Minor, Dave Morock

Halfback — Dana Stephenson, Tom Heller, Marlin Terwilliger

Safety — Randy Reeves, Jim Jansen, Fred Hollstein

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