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# INVESTIGATIVE TECHNIQUES

## Preliminary Field Tests for Crooked Dice

Whenever a dice gambling game is played, the house has a built-in mathematical advantage or takes a percentage of the pot. However, unscrupulous operators (or sometimes the players themselves) may increase their edge (or the players attempt to defeat the edge) by use of crooked dice. (See fig. 1.)

The Gambling Unit of the FBI Laboratory frequently receives dice for analysis to determine whether the dice have been manufactured or altered in such a way as to affect their use in a fair game. A showing that dice have been significantly altered may be important for prosecution in two ways: (1) Many State statutes

have separate offenses for the so-called "crooked" games, usually based on a theory of fraud, where the defendant takes an unfair advantage of the other players; and (2) even under the general types of gambling statutes, the courts may allow a showing that in an otherwise "fair" craps game altered dice were used—as an aggravating circumstance or simply to show fully the method of operation of the game. Moreover, the possible apathy of a player-witness toward prosecution of "friendly dealers" may be removed if he learns the game was in fact crooked.

### Types of Alterations

While a full and complete examination of dice must necessarily be done under laboratory conditions using precise measuring devices, X-ray photography, etc., and while many courts would prefer or require a

qualified expert to testify concerning the characteristics of the dice, it has been found that investigators under field conditions, with a minimum of study and practice, can spot a good majority of the common types of alterations. The following are intended to furnish the investigator with methods for field testing which can be beneficial in undercover work, executing search warrants, and dealing with witnesses and informants.

The following are the more common types of altered dice together with methods of recognizing them.

### Misspots

Fair dice are so manufactured that the faces or sides bear spots numbered from 1 through 6 and that two opposite sides added together always total 7. Misspots are so made that all 6 numbers are not represented and that all pairs of opposite sides do not total 7. (See fig. 2.)

One type of fairly obvious misspot has only the 5 on each face and, when coupled with a die having only a 6 and a 2 on each face, can only throw the numbers 7 and 11—quite an advantage on the "come-out" throw in a dice game when 7 and 11 are naturals and instant winners.

*" . . . investigators under field conditions, with a minimum of study and practice, can spot a good majority of the common types of [dice] alterations."*

A more subtle type of misspot has only three different numbers on the six faces, with each of the three numbers being repeated on the opposite face. Inasmuch as one can only see three faces of a die at any one time from any one position at a table, it is more difficult for players to spot these dice. As an example of such dice, whenever a pair of identical misspots bearing either 1-3-5 or 2-4-6 only are used, no odd numbers can be thrown. Thus, on the come-out throw in craps, the player could not throw

a natural 7 or 11. However, if such dice are thrown together after the come-out throw, then it would be impossible to throw a 7 (or loser). If a 1-3-5 and 2-4-6 misspot are thrown together on the come-out throw, the number of ways of throwing craps or losing points remain the same (4), but the ways of throwing a natural are doubled (16), thus making the odds in favor of winning as opposed to losing on the first throw 4-1, rather than 2-1 with fair dice.

In order to check for this type of alteration, the investigator should first look at each opposite pair of sides to determine that they are 1-6, 5-2, and 4-3. If misspots are found, there is little need to check for further alterations—they are crooked enough.

#### *Loads*

The interior portions of dice may be altered most commonly by two methods:

1. Part of the plastic material from which the die is made may be re-



Figure 1. House operators often increase the "house edge" against unsuspecting players by the use of crooked paraphernalia. Note "spare" crooked dice in shooter's hand in this simulated photograph.

moved and heavier substance added, such as lead (usually beneath one or more spots), to cause the die to tend to fall with that side down, thereby favoring the opposite side. This type of alteration is easiest in opaque dice where the load cannot be seen. It is more difficult in translucent dice, such as the more expensive type used by legal casinos, inasmuch as the alteration can be seen more rapidly. The spots are usually drilled out to a somewhat greater depth than before, the substance, such as lead, inserted, and then recovered with paint.

In order to check for loads, the dice should be very lightly held between the thumb and index or middle finger at two opposite corners. The die should be allowed to pivot, and if it does, a load is indicated. (See fig. 3.) The die should be held by various opposite corners to insure a complete test. With a little practice, most loaded dice of this type can be found except those with only very light loads. By carefully checking the various corners, it can be determined which face or faces are favored.

In addition to this test, a careful visual examination of translucent dice in some cases can disclose that certain spots have been drilled noticeably deeper than others.

2. The other common interior alteration of dice is the insertion of either a magnetic substance or a substance that may be attracted by a magnet. However, in this type of a magnetic dice, the load need not be so heavy as to be detectable by the above finger-holding test. The best method of field testing for such gaffing is to slowly pass a bar magnet past the various faces of the dice to see if an attraction is produced. (See fig. 4.) The crooked operator, in order to utilize magnetic dice effectively, either has an electromagnet installed in or about his dice table, or may be able to carry a magnet in his hand or on his person in such a manner as to be

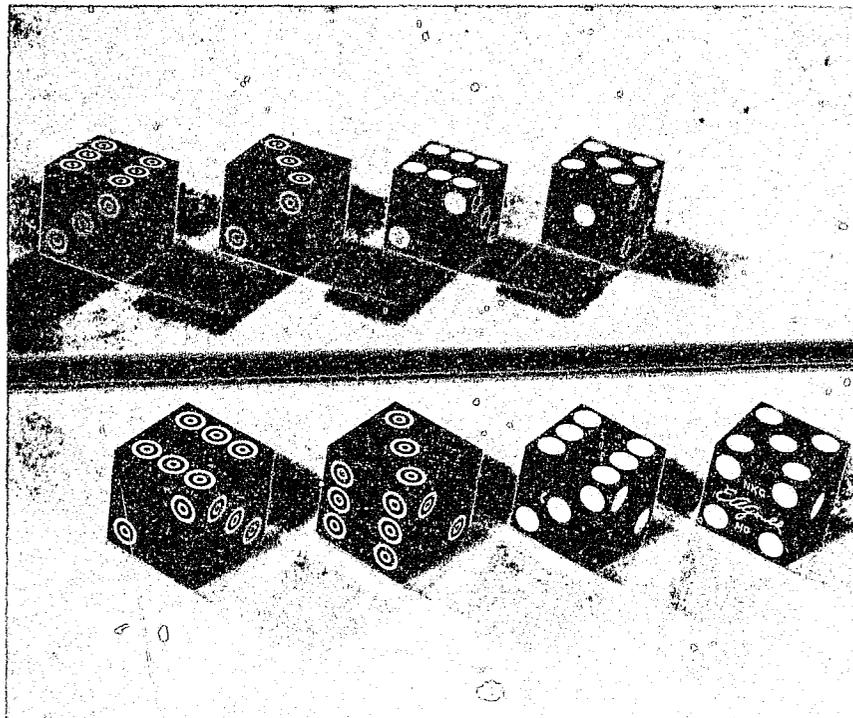
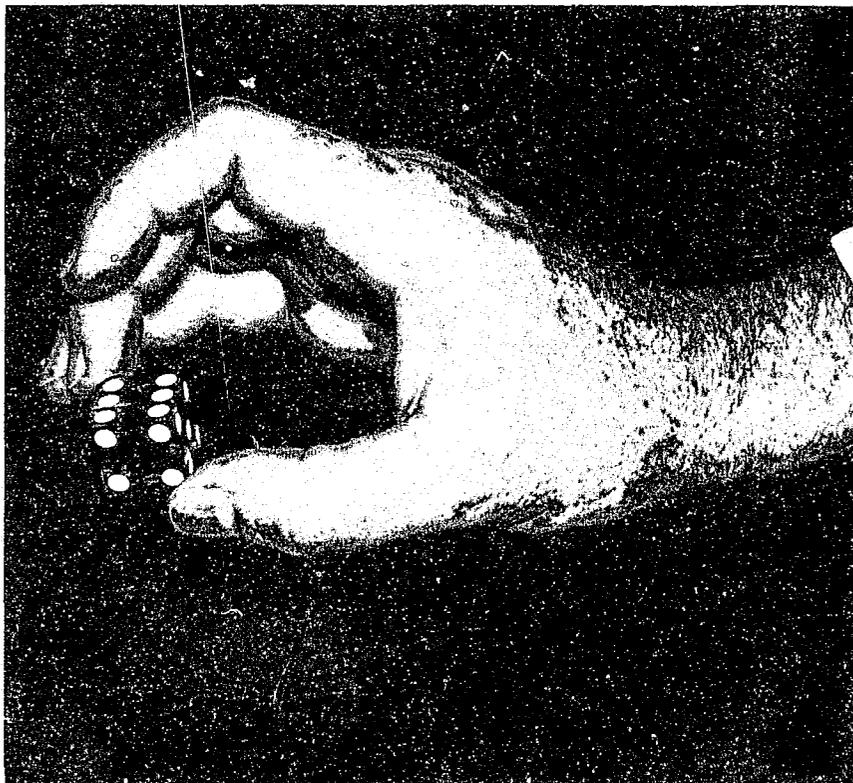


Figure 2. Duplicated spots on misspotted dice are reflected in mirror.

Figure 3. Testing for the spin of loaded dice by holding various opposite corners.



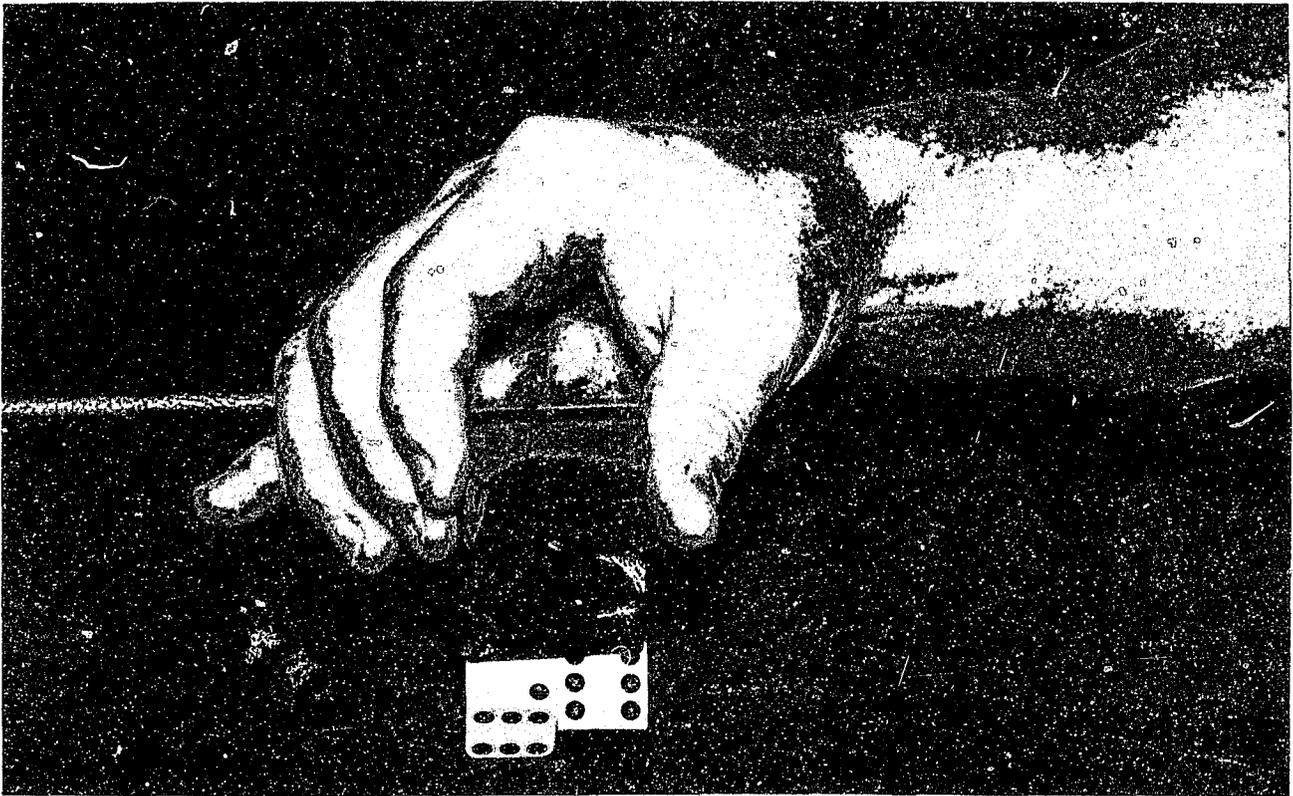


Figure 4. By passing a bar magnet over all sides, a test for magnetic dice can be made.

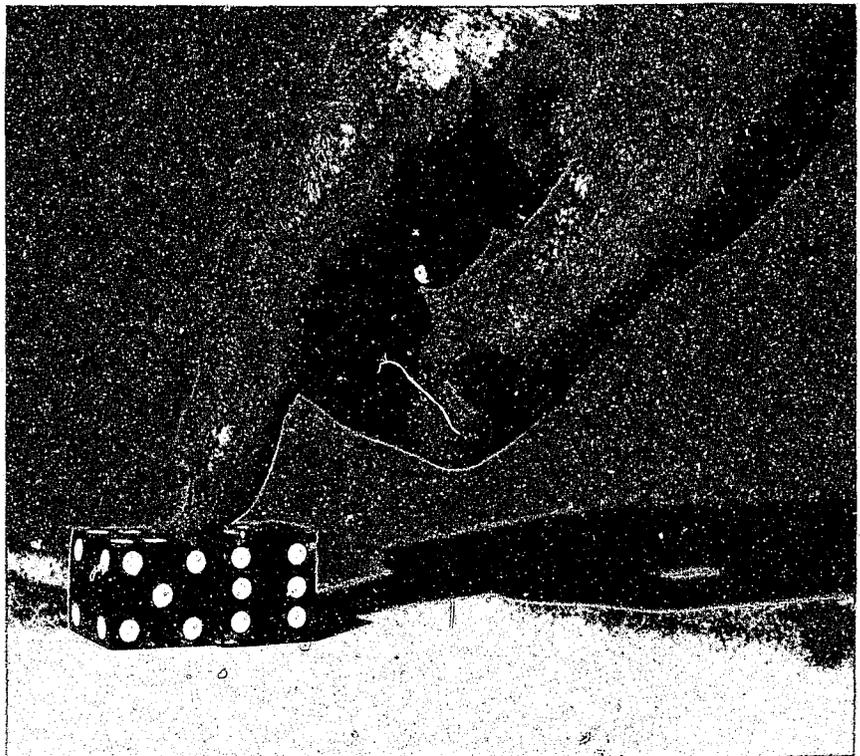
close enough to attract the dice.

Although the above tests can be quite effective, particularly important is a laboratory test, such as by X-ray, not only to establish if there is a load, but more importantly, to prove it in court pictorially, rather than simply to rely on someone's opinion that the dice are loaded.

#### *Flats or Bricks*

Another common type of altered dice is referred to as a "brick" or "flat." Such dice are so called because they are more or less flattened or brick-shaped. Thus the dice are not perfect cubes. This may be accomplished by sanding or flattening one side; by heating the dice and applying a heavy weight or vice to the dice to squash them; or by simply having dice so manufactured as not to be perfect cubes. The tolerance in the shape of good quality, fair dice is

Figure 5. Testing for "flats" or "bricks" by running finger over dice.



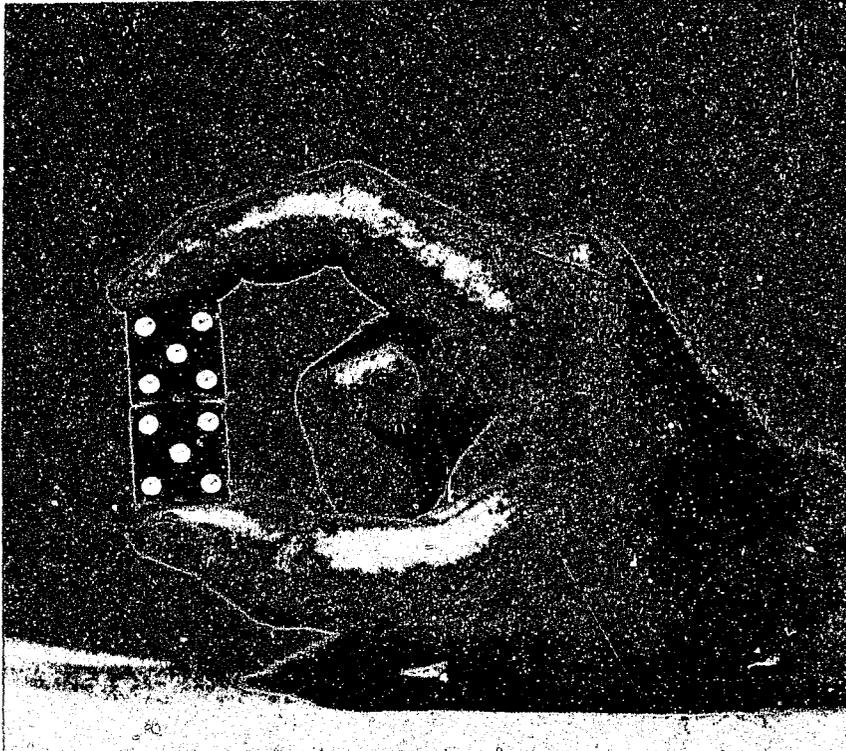


Figure 6. By attempting to rock the dice, a test for "rockers" can be made.

usually 0.001", whereas bricks are often 0.02" or more off true cubes. Experience has shown that the vast majority of brick dice are "6-ace flats," i.e., they are flattened so that the six and ace opposite sides have larger surfaces than the other four. In a craps game, this disfavors the shooter.

Any substantial variance in the cube-shaped character of the dice may be felt and usually observed by laying the pair of dice alongside each other on a perfectly flat surface and feeling across the top of the dice to find a difference in height. (See fig. 5.) Then one-at-a-time each die should be rolled over on one side and rechecked with the other die alongside it. As in the common 6-ace flats, when the 6 or ace side is face up and placed alongside its mate with the 4, 3, 5, or 2 up, a decided unevenness is felt when rubbing the finger across the top. The die with the 6 or ace up will feel

lower than the mate.

#### *Rockers or Bevels*

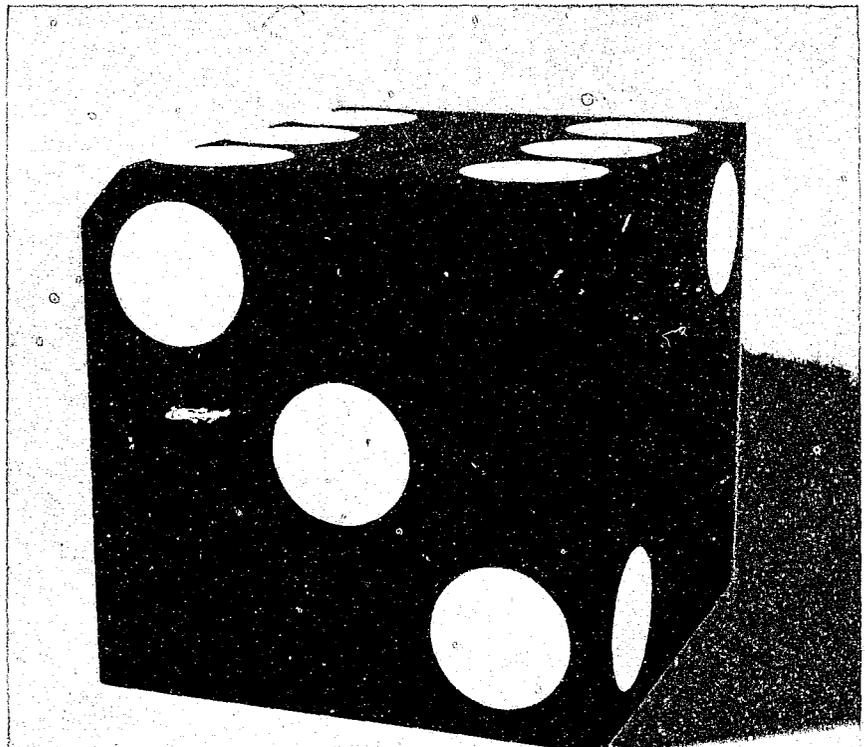
Another alteration, though less common, sometimes referred to as "rockers," also results in dice that are not true cubes. In rockers, certain entire faces are rounded, so that they tend to roll toward the favored surface, such as the 6-ace surfaces.

This type of dice may be found by placing the various sides of two dice against each other and attempting to rock them. If rockers are found, certain surfaces placed together will have a decided rocker effect. (See fig. 6.)

#### *Edge-work*

The last common alteration is done on the edges of the dice, often in conjunction with either rockers or flats. Most good dice have essentially razor-sharp edges. Fair dice with beveled edges should have the edges cut at 45° angles. When edge-work is employed,

Figure 7. Example of edge-work (improperly angled edge) on the 6 side.



the edges are not sharp (or right-angle-shaped) or not 45° angles, but are filed in such a manner as to result in one or more surfaces having an increased area. Very often the edges of the 6 and ace sides in 6-ace flats have decidedly beveled edges on only these surfaces. (See fig. 7.)

This type of alteration may be determined by close inspection of each edge of the dice. This is greatly facilitated by the use of a magnifying glass. However, close eye inspection will reveal most significant edge-work.

### **Tests for Alterations**

In summary, the following tests should be used to spot the great bulk of altered dice:

1. Be sure opposite sides total 7 (for misspots).

2. Lightly hold opposite corners to see if dice spin or rotate (loads) and pass magnet over each side (for magnetic dice).

3. Lay dice alongside each other and feel across the tops to see if level, checking all surfaces in this manner (for flats or bricks).

4. Put various surfaces against each other and see if they have a rocker effect (for bevels or rockers).

5. Visually, or with a magnifying glass, inspect all edges for improper angles (for edge-work).

It should be noted that in other than misspots, a testing of suspected altered dice by throwing them, even numerous times, will seldom produce significant results. The value of most altered dice (other than misspots) is in the long run, and the true effect can only be accurately calculated after many thousands of controlled tosses. For example, under laboratory conditions, at least 10,000 trials should be undergone before reaching definitive test conclusions. To illustrate this, if a test were run with fair dice on the

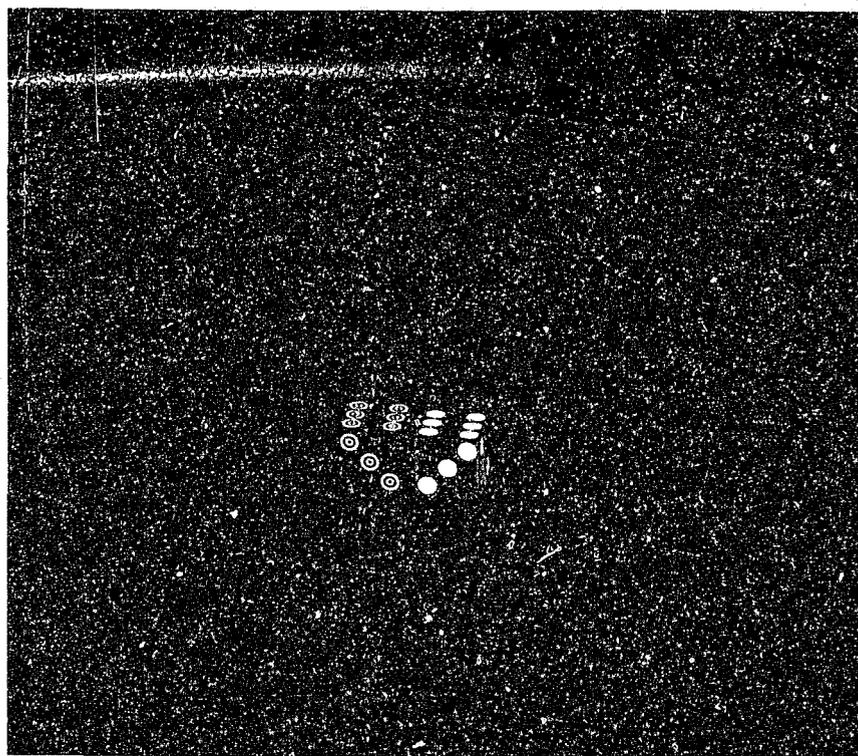


Figure 8. Common signal for crooked dice—die on left has three spots running wrong, die on right is correct.

throwing of the number of 7's in 50 throws, laws of probabilities say you would throw 7 about 8 times, but statistically you could reasonably expect this to vary anywhere from 3 to 14 times. On the other hand, if there were a test of 10,000 throws, probabilities tell us you should throw 7 1,667 times, while the statistical variance would only be about 37 times more or less than 1,667 times. This is a difference in expected variance from the total throws of about 24 percent in 50 throws to only about 1.5 percent in 10,000 throws. Contrary to popular belief, a pair of strong loads or obvious bricks, when thrown together, will not throw the favored numbers every time or even a majority of the time. Again, the crooked gambler merely wants to alter the fairness of the game in the long run.

It might also be pointed out that in many cases the manufacturer of crooked dice may purposely tip off

knowledgeable cheats by changing the manner of spotting the 3 side. By laying the die with the 6 spot upward running toward the viewer and the 3 side facing the viewer, the 3 spot should run from lower left to upper right (in fair dice), rather than from upper left to lower right (crooked dice). If the 3's are found to run in the wrong direction, this may suggest the dice are altered and point to a very careful inspection. (See fig. 8.)

### **Conclusion**

In conclusion, it should be emphasized again that the above tests are only field tests, not intended to replace careful laboratory examination, nor will this type of field test catch some more sophisticated alterations. Nevertheless, a familiarity with the tests can certainly benefit the investigator on the scene and may suggest additional laboratory testing.