Measuring and Managing Putting Green Trueness

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2013 Sabbatical to help the NZSTI with some research and consulting

Thanks for the support!

Outline

- What is putting green trueness?
- Why measure trueness?
- Methods to measure trueness
  - 3 research projects
- Factors that influence trueness
- Practices to manage trueness

What is putting green trueness?

Is a putting green true when…

- Its surface looks smooth
- Ball goes where it's intended
- Ball goes in the hole
- Ball doesn't bounce or wobble as it rolls

Why measure trueness?

Why measure trueness?

- Very important performance characteristic to golfers.
- Assess consistency between greens ??? (like speed)
- To determine how maintenance practices, etc influence it.
  - How long does it take for greens to become true after coring?
  - Does a change in management affect trueness?

Methods to measure trueness

Greenstester and R & A "Holing out test"

- Curved ramp
- Line-up ramp so balls go in hole
- Roll 10 balls
- Count # balls/10 rolls that go in hole
- 4/10 = bumpy surface?
- 10/10 = smooth surface?
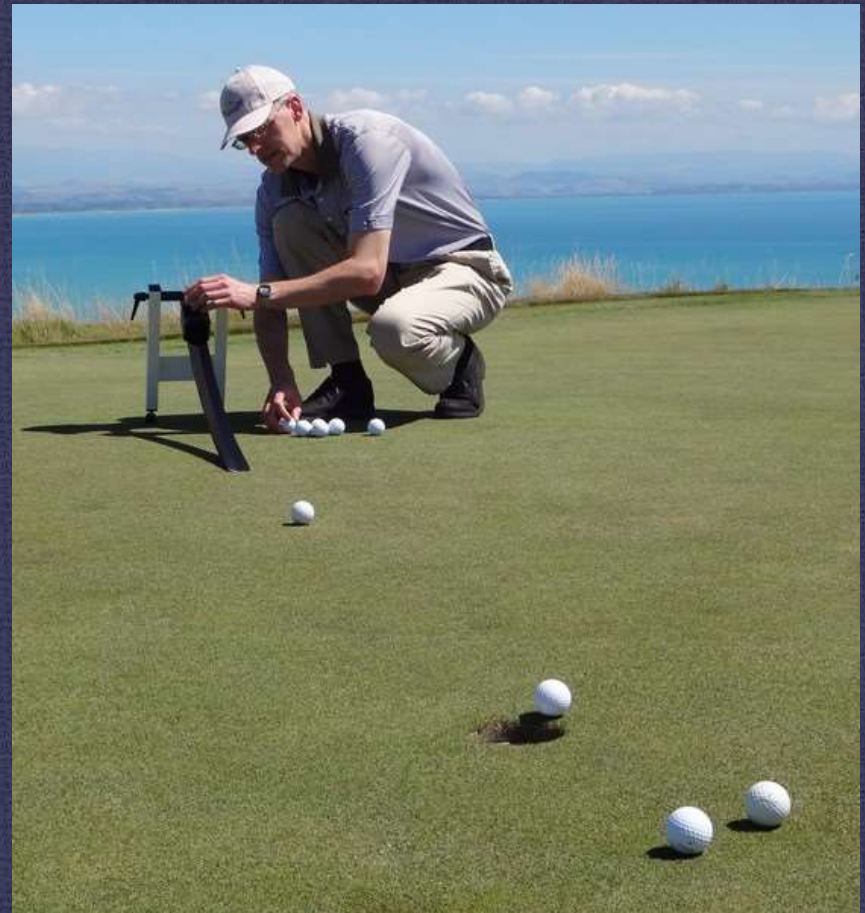
Flatter slope angle = less ball bounce than Stimpmeter

Ball bounce & exit

Less bounce than Stimpmeter

Ball #2 exits incorrectly

Research project #1

Project #1

Objective:

- To trial the Greenstester and HOT to assess trueness

- Plot study
- 9 cultivation treatments to create a wide range of disruption.
- Assess trueness recovery over 5 weeks using Greenstester & HOT.

1 plot

Scene 1. Bumpy surface

Videos

Scene 2. Smooth surface 10/10 balls

Scene 3. Bumpy surface but 9/10 balls
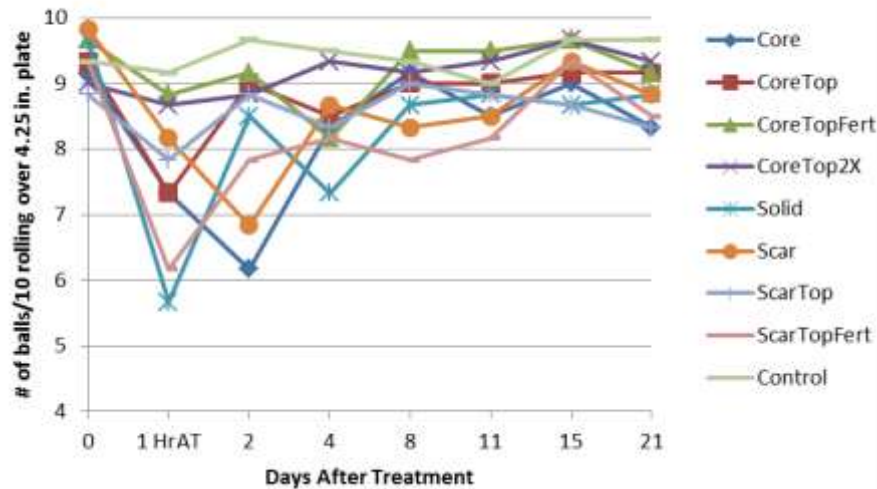   (watch how ball #3 exits ramp and misses plate)
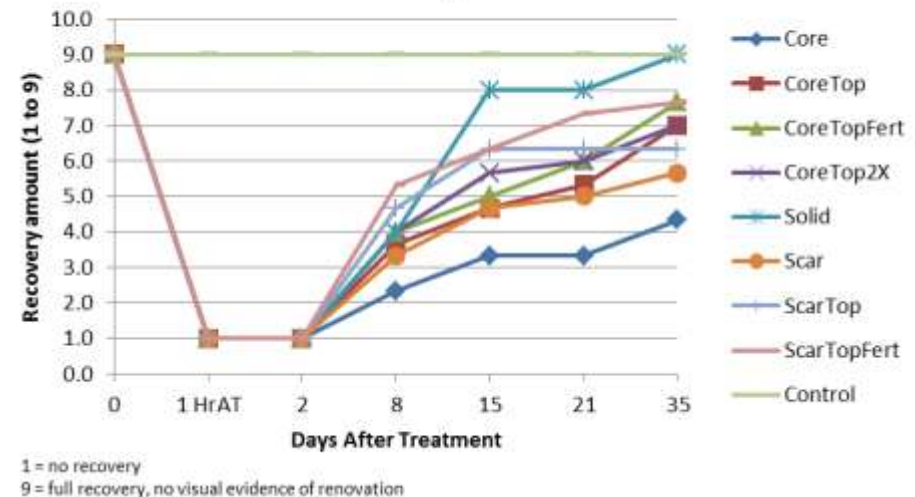
ThreeVideosCombined.m2ts

Results

- 4 days after cultivation = no trueness differences despite all cultivation-treated plots having significantly less recovery than the untreated control.
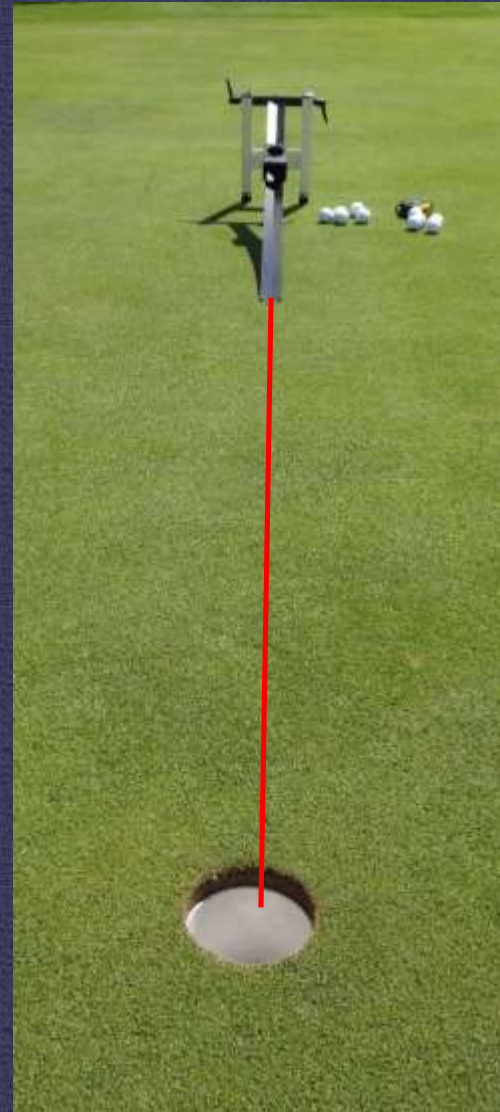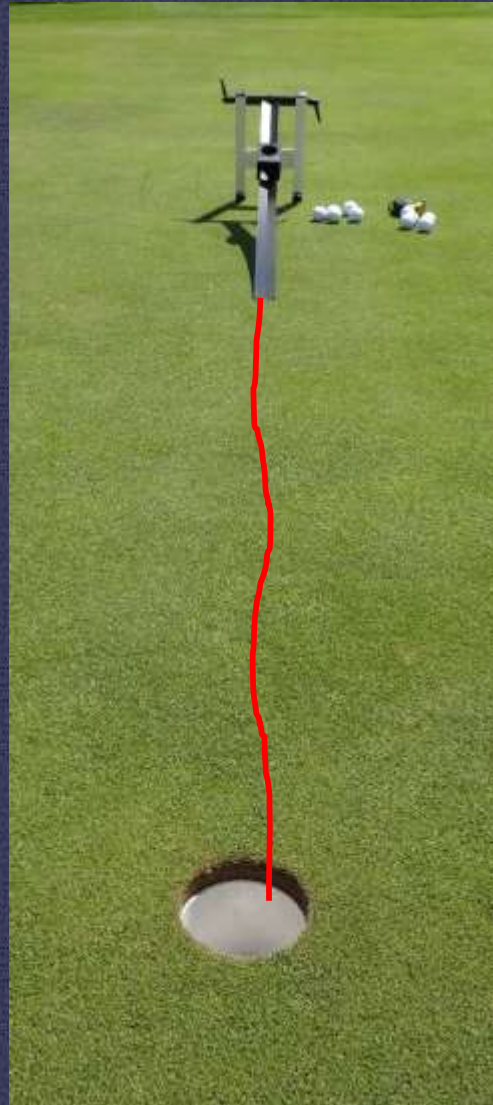
8 DAT

- Surprisingly, balls rolled across plots with open core holes bobbled and snaked yet most went in hole.

- Surface disruptions had less influence than expected on whether a ball goes into the hole.

- HOT was measuring something other than visual trueness.

< 10 ft

Proper line

Proper speed

Surface disruptions do not cause enough deviations for ball to miss the hole

Research project #2

Research project #2

Objective:

- To compare 3 methods for measuring putting green trueness.

NOTE: Part of a larger golf green benchmarking study in which data were collected from 50 courses across New Zealand.

Course visits

- Interviewed superintendent
- Collected data from 3 greens
- Tested 50/400 NZ courses
  - 150 greens

Variables measured

- Performance   (golfers concern)
  - Green speed
  - Trueness (smoothness)
  - Firmness
- Agronomic   (turf manager's concern)
  - Moisture content
  - Organic matter
  - Topdressing rate
  - Nitrogen rate
  - Grass species

6 methods to assess trueness

- STRI Trueness Meter^{TM}
- Parry meter
- Sphero
- Spread test
- HOT
- Bobble test

Methods tested in yellow

STRI Trueness Meter ™

- Sports Turf Research Institute.
- Developed in 2010
- Measures vertical & lateral deviation of metal wheel as it's pushed across surface.
- Not available for purchase.
  - Consultancy tool

STRI

http://www.blog.asianturfgrass.com/sports/

Parry meter

- Phone records ball movements
- Does it work?

Sphero

- App-enabled robotic ball
- Turf Infomatics
- Sphero Turf Research App
  - $200
- Data interpretation???
- No all made equal
- Auburn Univ.

Spread test

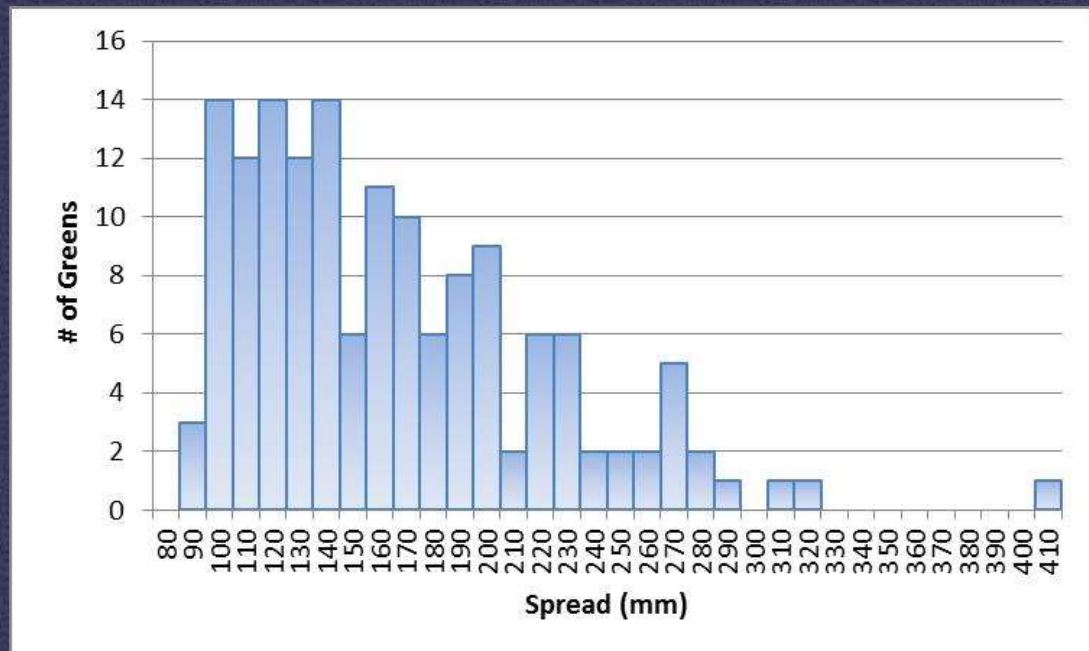4-6 balls rolled 8 ft off Greenstester
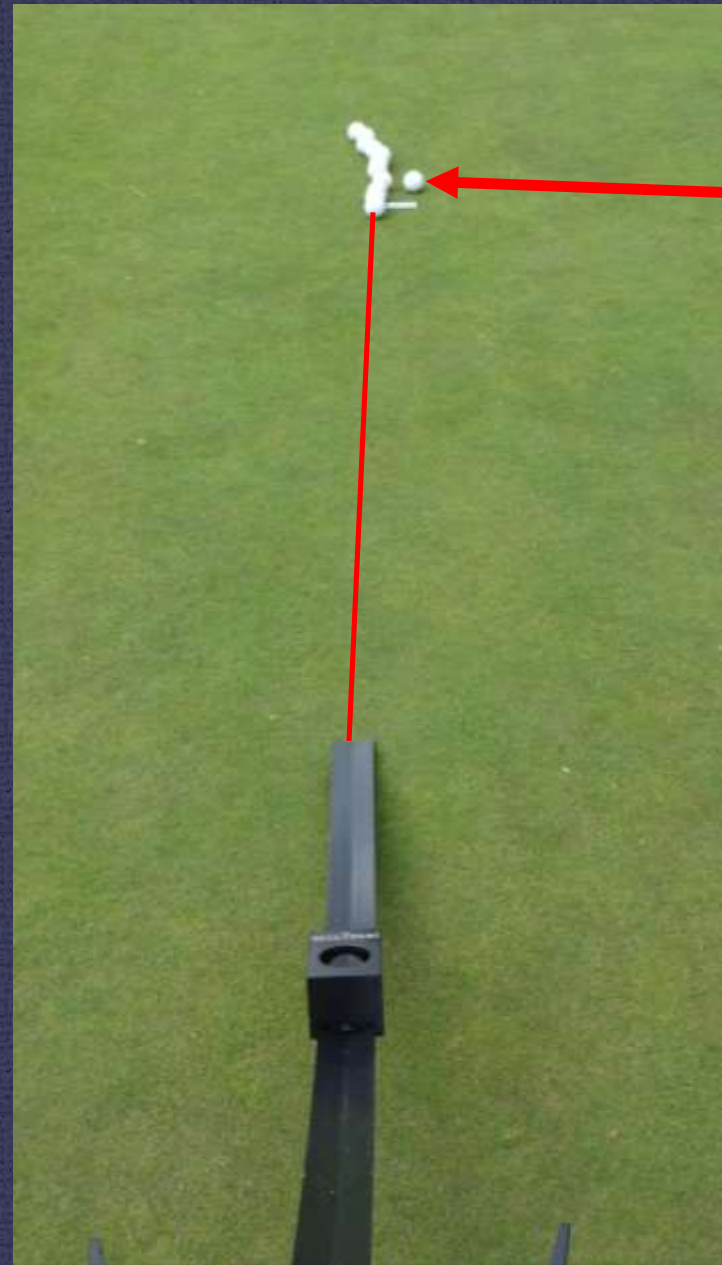
Spread = length + width

Large spread means bumpier surface

Spread test - Results

- Difficult to administer
  - Ball exit issues from Greenstester (omit balls exiting incorrectly)
- Tracking effect
  - Balls run on same line
  - Consecutive balls rolled farther
- More subjective than expected

Tracking effect
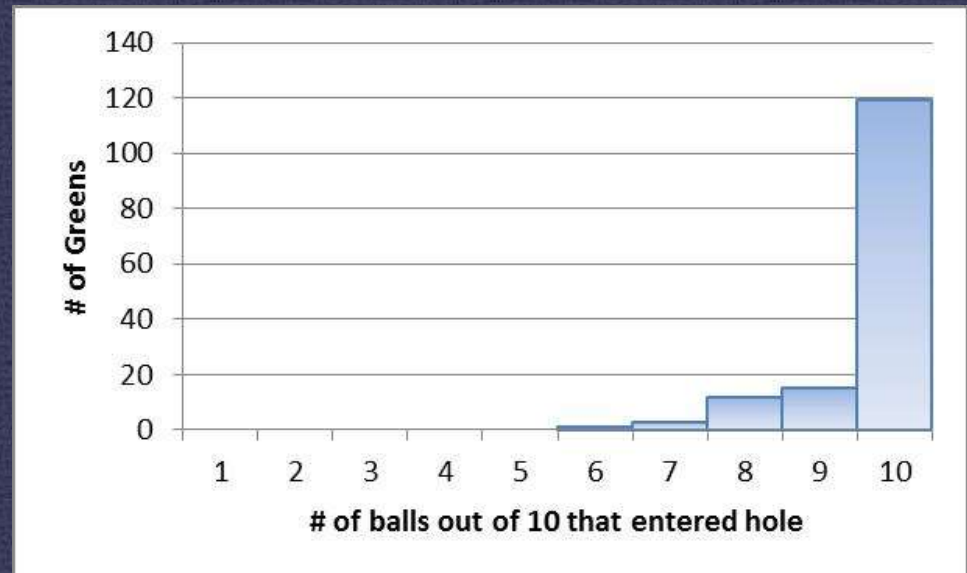

Exited ramp incorrectly

HOT

- Once per green using current hole location
- About 8 ft putt

HOT - Results

- Difficult to administer
  - Took up to 5 minutes to set up so 2 consecutive balls go into hole
  - Ball exiting issues
  - Tracking effect
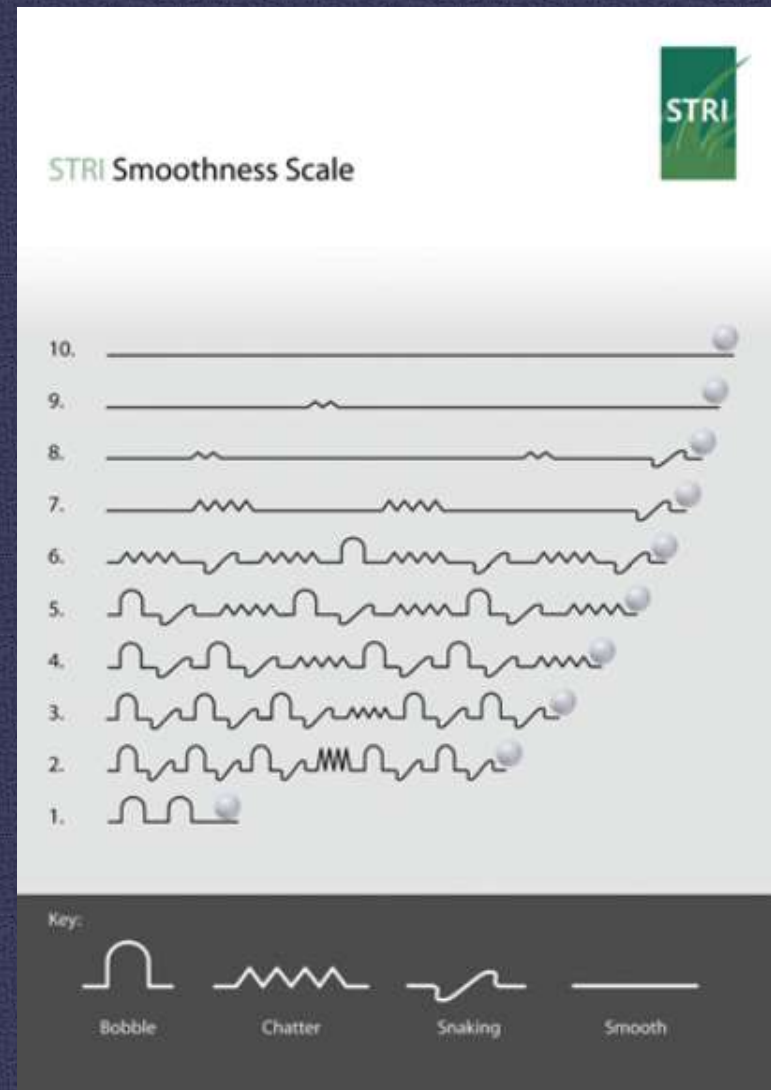- 119/150 (79%) greens had 10/10 for HOT

Bobble test

- Visual measure of trueness
- Roll balls 8 feet off Greenstester
- Rate amount of bobbling and/or snaking in last 4 feet
  - 10 = no bobbles or snaking
  - 9 = 1 bobble or snake
  - 5 = some bobbles & snaking
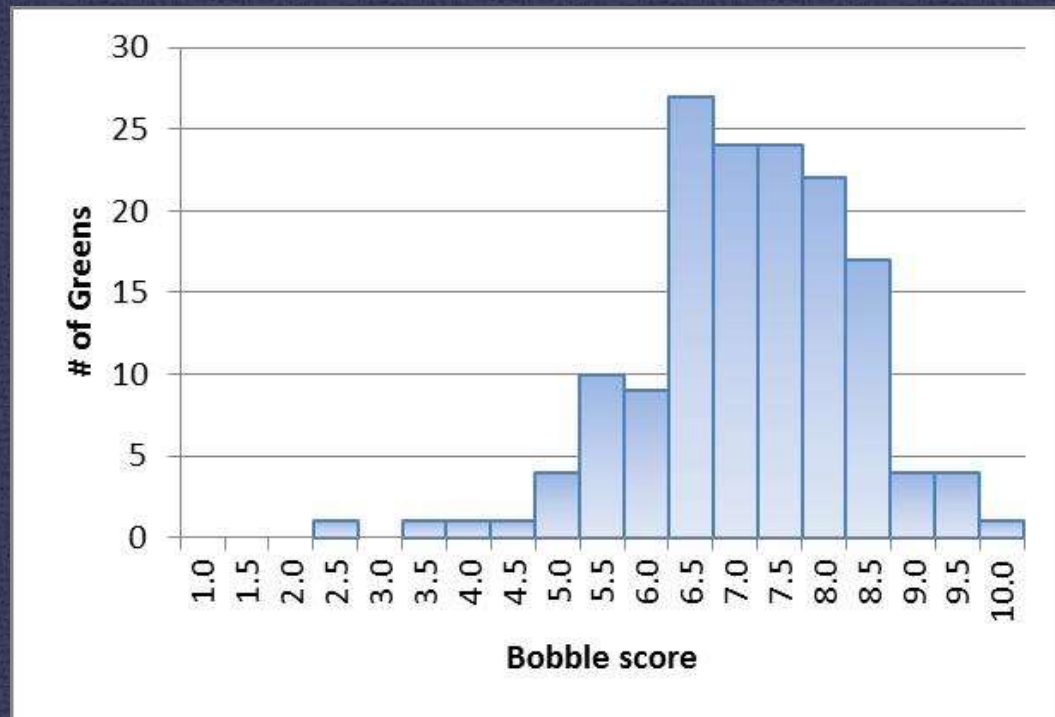 - 1 = many bobbles & much snaking

- STRI and NZSTI have used test for many years

Bobble test - Results

- Easy to administer
- Wider range than HOT
- Correlations between HOT & Bobble test were weak (r = 0.02 to 0.40) and most not significant at a = 0.01.

Conclusions

- Greenstester
  - Watch for exiting and tracking issues

- HOT and Bobble test measure different things.
  - Bobble = how surface affects the ball.
  - HOT   = how surface affects the ball going into hole.
  - Which is the golfer most concerned about ??
    - 2015 golfer survey

- HOT proves that despite the appearance of the putting surface and how the ball visually rolls, balls can still be holed when hit on the proper line with the proper speed.

Research project #3

Research project #3

Objective:

- To compare the three trueness methods in a more controlled environment than the golf course study.

3 treatments

Core + Topdress

No Core

Core

- 3 greens from 3 sites
- 3 methods to measure trueness

Perfect Putter ramp

No exit issues

Mean putting green trueness measured using 3 methods on 3 sites for 3 core cultivation treatments in 2015.

|	Wedgewood site			Five Ponds site			Delaware Valley site		
Treatment	HOT†	Spread‡	Bobble§	HOT	Spread	Bobble	HOT	Spread	Bobble
No Core	10.0 a¶	86 a	8.8 c	10.0 a	89 a	9.1 b	10.0 a	86 a	5.9 b
Core	9.0 a	168 b	2.8 a	9.5 a	178 b	3.8 a	9.4 a	156 b	2.4 a
CoreTopdress	8.5 a	149 b	4.4 b	9.5 a	162 b	3.9 a	8.9 a	130 a	3.5 a

¶ Means followed by same letter within column are not significantly different (Tukey's HSD, $P < 0.05$).

Which methods detected the wide range of trueness?

Which method is best?

- Bobble test!
- But stay tuned…..more research & improved technology

- How often does a golfer 1 putt from 8 feet?
  - 50% PGA tour player
  - 27% Golfer with 90 average
  - 95% HOT

- Mark Brodie   2014 "Every shot counts"
  - Shotlink & Golfmetrics
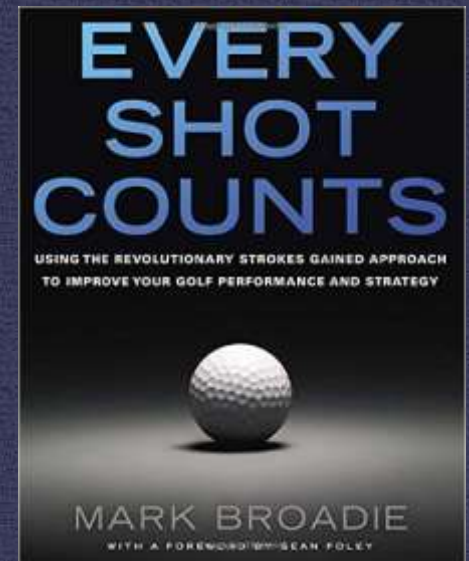
- Thus, humans introduce much error when putting

2015 Golfer survey

- How do golfers assess trueness?
- N = 306

1. What is your average 18-hole score
   A. < 80
   B. 80 to 95
   C. > 95

2. I determine putting green smoothness mostly by: (select one)
   A. How many times the ball bounces as it rolls.
   B. How many putts I sink.
   C. How the surface looks to my eye.

3. Rank photos based on the surface you think you can make the most putts.

   1 = I can make most putts on this surface
   2 = somewhere between most and least
   3 = I can make the least putts on this surface

Photo A

Photo B

Photo C
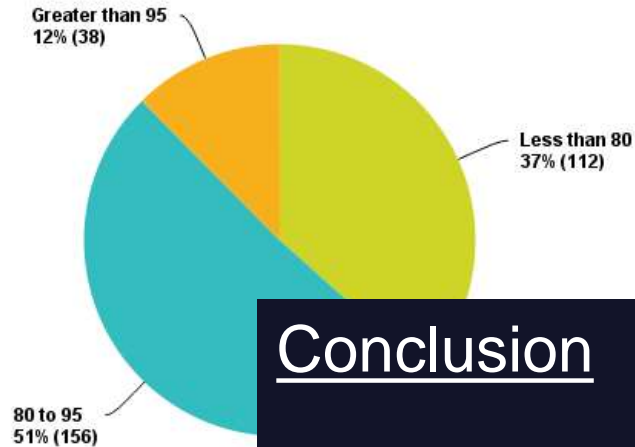

Aeration holes filled with sand

Unfilled aeration holes

No aeration holes

Q1 What is your average 18-hole score?

Answered: 306 Skipped: 0

Greater than 95
12% (38)

Less than 80
37% (112)

80 to 95
51% (156)

Q2 I determine putting green smoothness mostly by...

Answered: 306 Skipped: 0

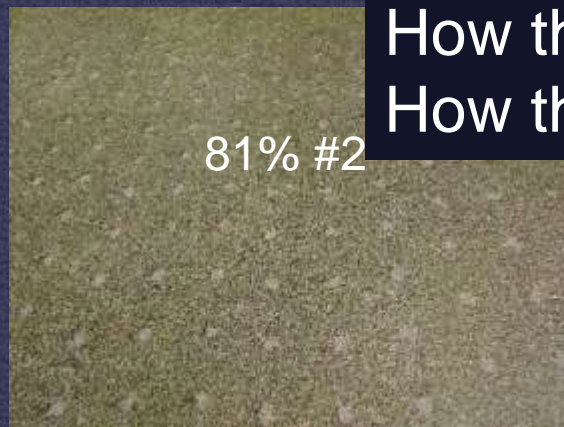71%

27%

How the surface looks to my eye.

Photo A

Conclusion

Golfers assess trueness visually by:
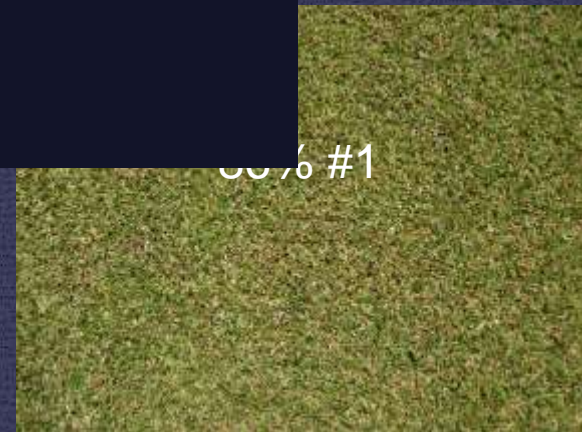
How the surface looks
How the ball rolls

81% #2

Aeration holes filled with sand

Unfilled aeration holes

No aeration holes

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Factors that influence trueness

Factors that influence trueness (visual)

- Turf uniformity
  - Polystand vs monostand
  - Grain?
  - Weeds
  - Turf injury
- Ball marks
- Footprints
- Tire imprints
- Management practices
  - Mowing, coring, grooming, verticutting, irrigation, fertilization
- Loose impediments
  - Tree leaves, branches, large sand grains
- Animals
  - Feces, earthworm casts, ant hills, holes

Remember – balls can still be holed with correct line and speed

Animal impediments

Tire imprints

3 pm

5 pm

Footprints
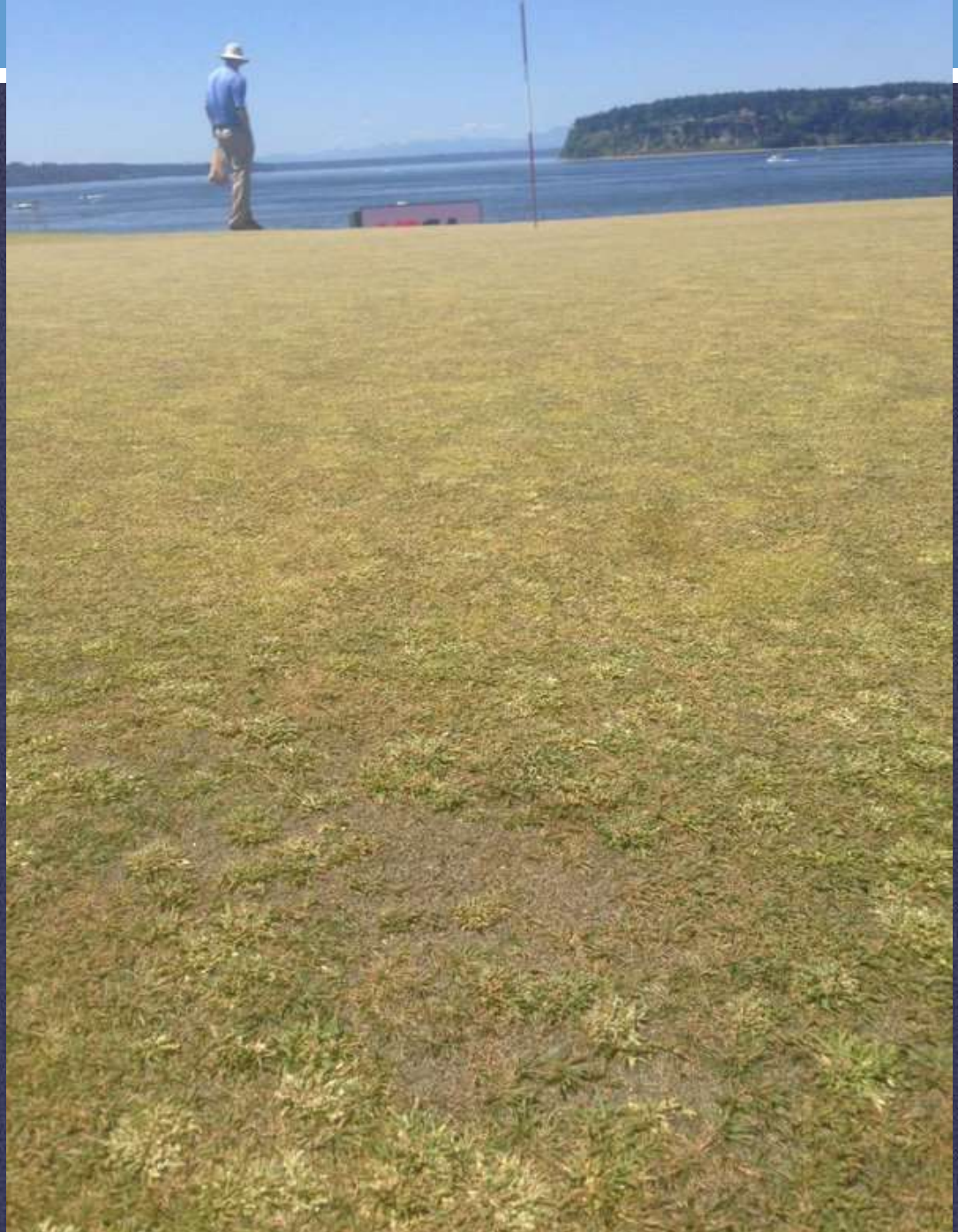
Observe surface imperfections as sun sets

Large sand grains

Polystand - non-uniform turf

2015 US Open at Chambers Bay

Ballmarks

Practices to manage trueness

Practices to manage trueness

- Any practice that promotes uniform turf
- Keep surfaces firmer (soft surfaces = footprinting)
  - Less water
  - Less fertilizer
  - Adequate drainage
  - Regular topdressing
  - Reduce thatch and dilute OM
- Rolling (the big equalizer)

Mowed and rolled just before testing

Soft surfaces get bumpier as more golfers play

Summary

- Various definitions of greens trueness.

- Various methods to measure it.

- Despite appearance of putting surface and how the ball visually rolls, balls can still be holed when hit on the proper line with the proper speed.

- Many factors influence trueness.

- Rolling is the big equalizer.

Share your story and comments:

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