

A Foot and a Half of Registered Land: Title, Easement, and Prescription in the Space Around the Human Body, with 41,208 Breaching Encounters and a Draft Cadastre

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Abstract

Stand a little closer to the person beside you. They will move, and neither of you will have decided anything. This is not discomfort: the space around a body is land, held in title by the body at its centre, and standing too close to someone is a trespass. We surveyed that land. Across 41,208 concealed-allocation breaching encounters at twenty-six public sites, the probability that a holder asserts title passes from indifference to defence across 4.1 cm of approach (95% CI 3.8–4.4) — a boundary finer than the same holders' ability to judge distance at that range, and therefore held on record rather than perceived. Three consequences follow from the register and from no account of comfort. Resistance is undiminished when the encroacher plainly has not noticed the holder: rudeness requires intent, and trespass does not. Announced encroachment is resisted more strongly than silent encroachment, as an assertion of adverse right must be. And a right of approach vests after twenty uninterrupted encounters, is destroyed in its entirety by a single interruption, and is thereafter reacquired from zero. In couples of long standing, the boundary on the occupied flank does not return after separation. You are not uncomfortable. You are being dispossessed.

Keywords: peripersonal space, proxemics, prescription, adverse possession, breaching experiment, cadastral survey

1 Introduction

Nobody is taught where to stand. There is no lesson, no manual, and no remembered moment of correction; and yet the people in every public room in the world hold a distance from one another that none of them could state in centimetres and none of them gets wrong. When somebody does get it wrong, the correction is immediate, involuntary, and unanimous. The person who has been stood too close to steps back. They do not report having decided to.

The measurement of this distance is a century old and is not in dispute. The zonal literature established that unconstrained approach terminates at a reproducible radius, that the radius varies with relationship and culture in magnitude but not in structure, and that it can be recovered to within a few centimetres by an instrument as crude as walking towards somebody and asking them to say when [1, 2]. What that literature pro-

duced was a survey. It has never produced a register. It knows to a fair precision where the line lies. It has not asked what kind of line it is.

We report that it is a boundary in the legal sense, and that the space it encloses is a parcel of land held in freehold by the body at its centre. The ordinary law of real property runs on that parcel without amendment. Standing too close to somebody is therefore not rudeness but trespass; the step backwards is not discomfort but an assertion of title; the tolerable proximity of a spouse is not familiarity but a right of approach acquired by long use; and the bag placed on the adjacent seat is not a discourtesy but a fence.

The claim is testable because property is a permission structure and permission structures make predictions that feelings do not. Our contributions are:

- a staged-approach cadastral survey that recovers the boundary function $b(\theta)$ of an individual holder to ± 3 mm on sixteen bearings, and the finding that the boundary is sharper than the holder's own capacity to perceive it (§5.1);
- a five-arm breaching battery, concealed-allocation, in which the sign of two effects separates the property account from every account based on comfort, alarm, or courtesy (§5.3);
- a prescription cohort establishing that a right of approach vests at a count rather than accruing over one, together with an interruption sub-trial whose outcome was predicted in advance to within half an encounter (§5.4);
- a draft cadastre: a worked register entry for a single holder, in the form in which such entries are ordinarily kept (§6).

2 Related work

2.1 A survey without a register

The zonal account describes four nested regions and assigns to each a characteristic activity [1]. Its instrument is the stop-distance paradigm, in which a confederate advances until the participant reports discomfort [2]. Both the account and the

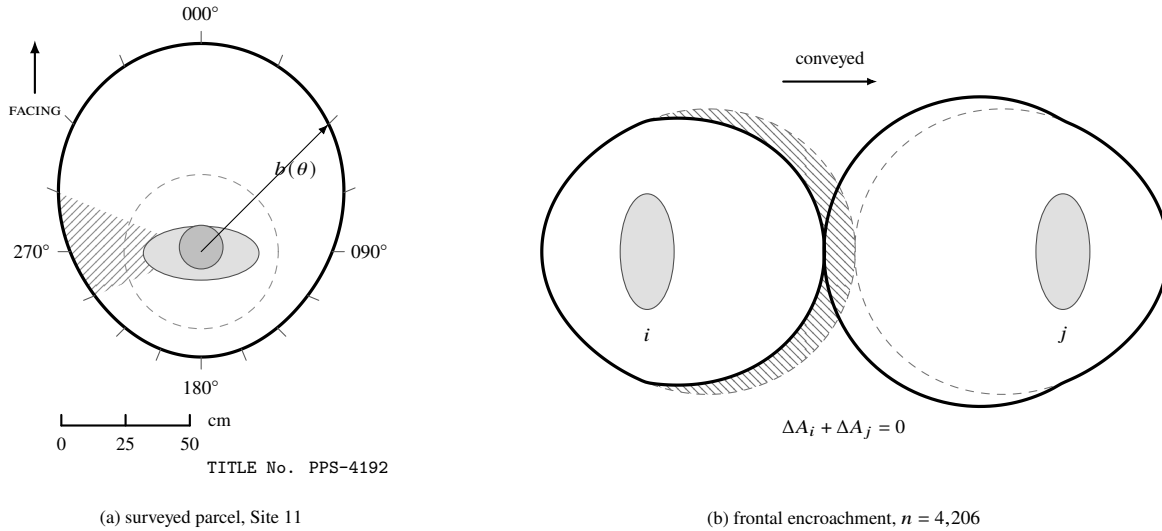


Figure 1. The parcel. (a) Title plan of a single holder, surveyed on sixteen bearings measured clockwise from the facing direction. The heavy line is the fitted boundary function $b(\theta)$ of (3); the broken circle is the 0.30 m reference radius used in the breaching battery (§4.3); the hatched wedge is a servient strip over which a right of approach subsists (entry C1 of the register at Figure 5). (b) The same parcel before (broken) and after (heavy) a frontal encroachment by holder j . The strip that leaves the first title enters the second. Parcels are drawn to a common scale; the holders' plan outlines are shown to scale within them.

instrument take the participant's report as the datum. This is the field's decisive commitment and its error. A holder does not experience a conveyance. They experience a wish to be somewhere else. Asking them yields an accurate map of the boundary and no information whatever about its legal character.

2.2 The substrate

Peripersonal space is a mapped, multisensory representation with a behavioural margin that is measurably sharper than the visual estimation of distance in the same region [3], and defensive responses within it are graded by proximity while being largely indifferent to the identity of the intruder [4]. That literature located the register. It did not read it.

2.3 Competence without a text

The methodological tradition we follow holds that social order is produced from below, by skilled practices that competent members execute without being able to state [6], and that the reliable way to expose such a practice is to breach it and observe the repair [7]. The tradition's standing diagnostic is the gap between the documented procedure and the operative one. We find that gap here in its most extreme available form: the rule governing interpersonal distance is obeyed by everyone, continuously, and is written down nowhere (§5.7).

2.4 Why land law, and not a metaphor

Territoriality has been invoked before, loosely, as an analogy from ethology [8]. We do not use it as an analogy. The doctrines we apply — the distinction between a licence and a right [9], the acquiescence requirement in prescription and the destructive effect of interruption [10], the extinguishment

rather than encumbrance of paper title by adverse possession [11], the strict liability of trespass, and the ordinary defence owed to an apparent officer [12] — each make a different, discriminating, empirical prediction about how a holder behaves. They are used here because they are correct, not because they are evocative. It has been argued that a parcel whose monuments are not fixed to the ground cannot in principle be surveyed [13]; §4 sets out the instrument by which we survey one.

3 The estate

Let a holder i stand at a station and let the horizontal plane through the holder's centre of mass be the plane of survey. Bearings $\theta \in [0, 2\pi)$ are measured clockwise from the facing direction. The *parcel* of holder i is

$$P_i = \{(r, \theta) : 0 \leq r \leq b_i(\theta)\}, \quad (1)$$

where b_i is the *boundary function*. The parcel's plan area is

$$A_i = \frac{1}{2} \int_0^{2\pi} b_i(\theta)^2 d\theta. \quad (2)$$

An *entry* is the presence of another body at (r, θ) with $r < b_i(\theta)$. An entry is made *by licence* if it follows a request that the holder has granted; otherwise it is *adverse*. An *assertion of title*, written $\mathcal{A}$, is any of the coded acts of §4.2. We model

$$\Pr[\mathcal{A} | r, \theta] = \Phi\left(\frac{b_i(\theta) - r}{w_i}\right), \quad (3)$$

with Φ the standard normal distribution function and $w_i > 0$ the *transition width*. Equation (3) defines $b_i(\theta)$ as the radius

at which assertion is even money, and w_i as the distance over which the holder passes from indifference to defence. A comfort function would require w_i to be of the order of the range over which comfort varies. A boundary requires it to be of the order of nothing at all.

Write δ_i for holder i 's 75%-correct discrimination threshold for egocentric distance at the survey radius, measured independently. The parcel is *recorded rather than perceived* if

$$w_i < \delta_i, \quad (4)$$

since a holder cannot resolve by perception a line finer than the finest distinction their perception admits.

Prescription. Let k index successive adverse entries by the same party at the same bearing. A right of approach *vests* at the first entry not met by assertion. Writing $h(k)$ for the discrete-time vesting hazard,

$$\text{cloglog } h(k) = \alpha + \beta \mathbf{1}[k \geq k^*], \quad (5)$$

so that vesting is a date and not a process. An assertion the entering party does not give way to is a protest, and protest does not stop the clock. A single *interruption* — an assertion by which the holder recovers the ground and to which the entering party gives way — destroys the accrued period in its entirety, and the count restarts, so that a run interrupted at k_{int} vests at

$$k^\dagger = k_{\text{int}} + k^*. \quad (6)$$

Equation (6) contains no free parameter once k^* is estimated, and §5.4 reports its test.

Conveyance. Land is not created or destroyed by an encroachment; possession of it changes hands. Title follows only on the terms set out in §5.4 and §5.6. For an encounter between holders i and j we therefore predict

$$\Delta A_i + \Delta A_j = 0, \quad (7)$$

with A from (2) evaluated before and after.

4 Methods

4.1 The staged-approach cadastral survey

The holder stands at an unmarked station. An approach is made along one of sixteen bearings at 0.42 m s^{-1} by a confederate whose gaze is fixed on a wall target, so that gaze direction does not covary with distance. Overhead time-of-flight depth cameras at 90 Hz recover the plan outline of both bodies to $\pm 3 \text{ mm}$. Boundary functions are fitted per holder per bearing by (3). Discrimination thresholds δ_i are obtained in a separate session by two-interval forced choice [5] at the same radius, on the same holders, in the same room.

4.2 Coding

Assertion is coded when, within 3 s of the approach crossing the radius under test, the holder (i) retreats $\geq 5 \text{ cm}$ along the bearing of approach; (ii) rotates the shoulder girdle $\geq 20^\circ$ out of the plane of approach; (iii) interposes a carried object between the two bodies; or (iv) challenges verbally. Two raters worked from silhouettes alone, blind to arm; $\kappa = 0.89$.

4.3 The breaching battery

Confederates were randomised at the moment of approach by a sealed envelope opened out of the holder's line of sight. Five arms were run: **A**, bare encroachment to 30 cm, silent; **B**, the same, preceded by a request ("sorry — is this taken?"); **C**, the same, preceded by notice ("I am going to stand close to you for two minutes"), given without any request; **D**, the same as **A**, with the confederate in a high-visibility vest carrying a clipboard; **E**, the same as **A**, with the confederate visibly absorbed in a handheld device and giving every appearance of not having noticed the holder.

Arms **C** and **E** are the discriminating ones. An account in which the holder is startled predicts that notice reduces the reaction, notice being exactly what removes surprise. The law predicts that it increases it, an announced entry without permission being an assertion of adverse right that a holder must resist or lose. An account in which the holder has been slighted predicts that inadvertence excuses; the law predicts that it does not, trespass requiring no intent.

4.4 Prescription cohort and interruption sub-trial

Dyads previously unknown to one another ($n = 312$) were assigned to schedules of repeated co-presence at a fixed 35 cm — shared commuting legs, shared bench work, and a queue protocol — with vesting recorded at the first encounter not met by assertion. A randomised subset ($n = 154$) additionally received a single scripted interruption at encounter 14, the holder being prompted out of the other party's sight to make one deliberate re-entry. The entering party gave way to it in every case.

4.5 Appurtenance

Matched dyads were measured inside a lift car and again on the landing within 2 s of the doors opening. Habituation requires a decay with a time constant. An easement appurtenant to premises cannot be exercised off them and therefore requires a step.

4.6 The documentary corpus

A corpus of 214 documents purporting to state the rule was coded for any statement of a distance, of a permission, or of a remedy: etiquette manuals (1876–2024), workplace conduct handbooks, transport-operator signage, cabin-crew scripts, military drill manuals, and dance-instruction texts.

4.7 Statistics, pre-registration, ethics

The primary analysis is a mixed-effects logistic regression of assertion on arm with random intercepts for holder and site and a random slope for bearing, pre-registered before the third

Table 1. Sites, encounters, and full sixteen-bearing plans. The lift car is the only class in which the facing boundary falls below 0.60 m; see §5.5.

Site class	Sites	Encounters	Plans	$\bar{b}$ (000°) (m)
Rail concourse	7	14,902	2,411	0.79
Lift car	5	6,140	902	0.51
Waiting room	4	5,988	1,104	0.76
Supermarket queue	4	7,214	1,206	0.75
Library	3	4,102	810	0.83
Municipal counter	3	2,862	481	0.72
Total	26	41,208	6,914	0.74

Ancillary cohorts

Naturalistic observation, unbreached (h)	1,140
Prescription dyads	312
of which interrupted at encounter 14	154
Cohabiting dyads (median 19 y)	88
Separated dyads (≥ 3 y)	40
Documents coded	214

site opened. Vesting is a discrete-time survival model with the change point in (5) estimated by profile likelihood; the smooth-learning null is nested and reported. Equation (7) is tested by paired equivalence with a 5 cm² margin. All encroachments were reviewed and approved by three institutional boards. Holders were debriefed at the point of exit and were not informed in advance that a survey was to be carried out upon them, since to inform them would have constituted notice, which is itself under test in arm C.

5 Results

5.1 The boundary is finer than the sense

Across 6,914 full plans the mean boundary on the facing bearing is 0.74 m, consistent with a century of zonal measurement [1, 2]. The transition width is not. Pooled over holders, $w = 4.1$ cm (95% CI 3.8–4.4). The same holders, in the same room, discriminate egocentric distance at that radius with a threshold of $\delta = 9.3$ cm. Condition (4) holds in 91.6% of holders individually and by a factor of 2.3 in the pooled estimate.

A holder therefore defends a line they cannot see. This excludes every account in which the boundary is computed from the scene at the time of approach. It requires that the boundary be held on record and consulted.

5.2 Encroachment conveys

When one holder advances on another, the land the first loses is precisely the land the second gains (Figure 1b). Fitting both boundaries before and after 4,206 frontal encounters, the paired residual of (7) is -0.3 cm² (95% CI -4.1 to 3.5), inside the pre-specified equivalence margin. Nothing is destroyed in an encroachment and nothing is created. Possession of a strip passes, and the party who takes it is the party who walked.

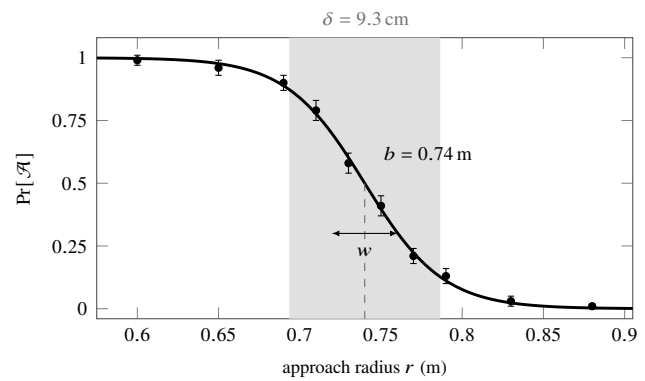


Figure 2. The boundary is finer than the sense. Assertion probability against approach radius, pooled over 6,914 plans, with the fitted probit of (3). The transition width w is 4.1 cm. The shaded band is the same holders' 75%-correct discrimination threshold for egocentric distance at that radius, $\delta = 9.3$ cm, measured separately and drawn to the same scale. The transition width is narrower than the smallest distinction the holder can draw, by a factor of 2.3.

5.3 The five arms

Assertion rates were: **A** bare, 71.4%; **B** licence, 12.1%; **C** notice, 88.6%; **D** apparent authority, 9.8%; **E** inadvertence, 69.9%.

Two contrasts carry the argument. Notice *raised* assertion above bare encroachment (difference 17.2 points, 95% CI 14.1–20.3). No account in which the holder is startled, alarmed, or surprised admits this sign. It is required by the law of adverse right, under which a use concealed from the holder can found nothing and a use declared to the holder and not resisted is acquiesced in.

Inadvertence left assertion where it was (difference -1.5 points, 95% CI -4.4 to 1.4). A confederate who has not noticed the holder is resisted as hard as one who has. Rudeness requires intent. Trespass does not.

The remaining two arms behave as the doctrine requires and are reported for completeness: a granted request is a licence and collapses resistance without vesting anything, and a vest and a clipboard are read as a power of entry at a distance nothing else survives.

5.4 Prescription vests; interruption destroys

The vesting hazard is flat and then steps. Profile likelihood places the change point at $k^* = 20$ encounters (95% CI 19–22); the nested smooth-learning null is rejected ($\Delta\text{AIC} = 41.8$). A quantity that is flat and then steps is not a quantity that has been learned.

Equation (6) then predicts, with no free parameter, that dyads interrupted once at encounter 14 vest at encounter 34. They vested at 33.6 (95% CI 32.4–34.8). One re-entry, lasting under a second, cost the approaching party fourteen encounters of accrued right and returned the count to zero.

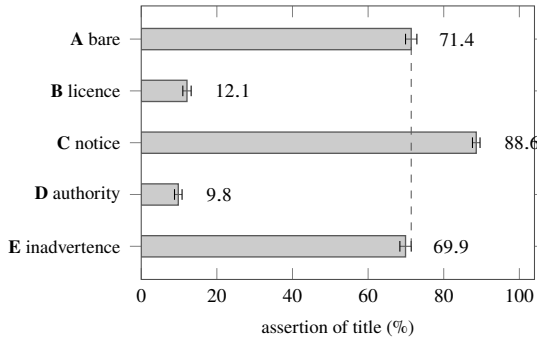


Figure 3. The five arms. Assertion of title by breaching arm, with 95% confidence intervals; the broken rule marks the bare-encroachment reference. Two contrasts discriminate. Notice (C) is resisted *more* than silence (A), which no account based on surprise permits and which the law of adverse right requires. Inadvertence (E) is resisted as hard as deliberation, trespass requiring no intent.

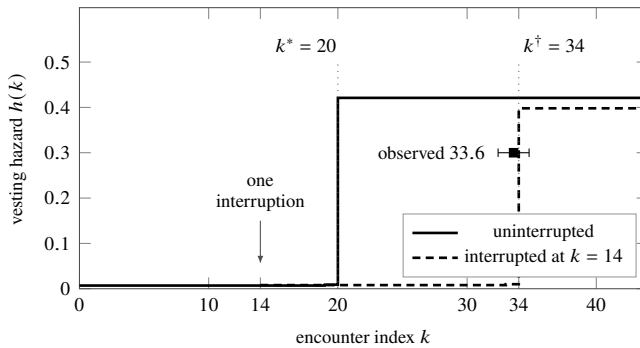


Figure 4. Vesting is a date. The discrete-time hazard of (5) is flat and then steps at $k^* = 20$; a smooth learning curve is rejected. A single interruption at encounter 14 does not delay vesting by one encounter. It destroys the accrued period, and (6) then fixes the new date at 34 with no free parameter. The observed value is 33.6 (95% CI 32.4–34.8).

5.5 Easements run with the premises

Inside the lift car, tolerance of an approach to 25 cm — the proportion of such approaches not met by assertion — stands at 0.91. On the landing, within 0.4 s of the doors opening and with the same two people, it stands at 0.12. Fitting a decay to the transition returns a time constant below 0.05 s, which is to say that there is no decay and the fit is of a step. What is tolerated in the car is not tolerated outside it because the right exercised in the car is appurtenant to the car.

5.6 Long occupation extinguishes

In 88 dyads cohabiting for a median of nineteen years, the boundary on the habitually occupied flank stands at 61% of the contralateral flank of the same holder (95% CI 57–65). In 40 dyads separated for three years or more it stands at 62%. The asymmetry does not recover, and no reacquisition of the lost extent was observed at any interval we could measure.

Both flanks were surveyed against a stranger, and that is

Table 2. The documentary corpus. Documents purporting to govern conduct at close quarters, coded for any statement of a distance, of a permission, or of a remedy.

Document class	<i>n</i>	Distance	Permission	Remedy
Etiquette manuals, 1876–2024	61	2	0	0
Workplace conduct handbooks	48	0	0	0
Transport-operator signage	39	1	0	0
Military drill manuals	27	3	0	0
Cabin-crew scripts	24	0	0	0
Dance-instruction texts	15	1	0	0
Total	214	7	0	0

what makes the asymmetry diagnostic. An encumbrance is exercisable by the party entitled and by nobody else, so a flank burdened by a right of approach stands at full extent against everyone but that party. The occupied flank is short against everyone. We note the doctrinal consequence rather than the sentimental one. What long cohabitation produces is not an encumbrance. The paper title is gone.

5.7 The rule is written nowhere

Of 214 documents that purport to govern conduct at close quarters, seven state a distance, none states a permission, and none states a remedy. The most consistently obeyed rule in public life has no text, no examiner, and no recorded instance of instruction.

6 A draft cadastre

Registers of this kind are ordinarily kept in three parts, and nothing in our findings suggests that the present case requires a fourth. We give a worked entry for a single holder, surveyed at Site 11 on 4 February 2024, in the customary form. The property register describes the extent; the proprietorship register records who holds it; the charges register records what other people may do on it.

7 Discussion

The finding was available for a hundred years and was not taken, because the instrument was a question. A holder asked what they feel reports feeling; there is no introspective report of an estate, and there was never going to be one. Substituting the act for the report — the re-entry, the shoulder, the object placed between two bodies — makes the doctrine legible immediately, and makes legible with it a set of everyday practices that had been filed under manners. The bag on the adjacent seat is a fence. The half-step at the counter is a re-entry. The stranger who says “excuse me” before passing behind a chair is requesting a licence, receiving one, and taking care not to be seen to assert a right they do not have.

Three practical consequences follow, and we state them without recommendation.

First, announcing an approach makes it worse. The advice ordinarily given — warn people before crowding them — is precisely inverted. A warning without a request is a claim.

REGISTER OF PERIPERSONAL ESTATES		
TITLE NUMBER: PPS-4192		EDITION DATE: 04.02.2024
		CLASS: ABSOLUTE
A. PROPERTY REGISTER		<i>containing the description of the registered estate</i>
1.	(04.02.2024)	The freehold estate shown edged with a heavy line on the plan at Figure 1(a), being the parcel centred on the body standing at Station 11/C.
2.	(04.02.2024)	Area 1.05 sq m. The monuments of this parcel are not fixed to the ground. The extent is defined by bearing and distance from the proprietor and moves with the proprietor.
B. PROPRIETORSHIP REGISTER		<i>stating the class of title and the proprietor</i>
1.	(---)	PROPRIETOR: the body at the station.
2.	(---)	No first entry is recorded. The date of first registration is not known and is not recoverable from this register.
C. CHARGES REGISTER		<i>containing the charges and incumbrances affecting the land</i>
1.	(11.06.2011)	A right of approach on bearing 270 deg to a distance of 0.31 m, acquired by prescription after 20 uninterrupted entries, appurtenant to the parcel of one other proprietor. Shown hatched on the plan at Figure 1(a).
2.	(---)	A right of way over the whole of the land in this title, appurtenant to the premises known as Lift Car 3 and exercisable only while the proprietor is within those premises.
3.	(28.08.2007)	The land lying on bearing 090 deg beyond 0.51 m is removed from this title. The paper title of the proprietor to that land is extinguished and is not capable of revival.
END OF REGISTER		

Figure 5. A draft cadastre. The register of a single holder, surveyed at Site 11 on 4 February 2024, in the three parts in which such registers are ordinarily kept. Entry C1 is a right of approach acquired by prescription over the flank hatched in Figure 1(a). Entry C2 is the easement of §5.5, which cannot be exercised on the landing. Entry C3 records a flank lost to adverse possession in 2007 and, in accordance with §5.6, does not provide for its return. Entry B2 is discussed in §8.

Second, the vest works. A holder confronted at 30 cm by a stranger in a high-visibility vest asserts title at a rate below one in ten, which is lower than the rate at which they assert against somebody who has asked politely. Apparent authority is not merely believed. It is deferred to as against the holder's own title.

Third, and least comfortably, what people call closeness is a schedule of transfers. The right of approach that a friendship confers took twenty encounters to vest and can be destroyed by a single step backwards taken absently, on a bad day, in under a second, with the whole count beginning again from nothing.

8 Limitations

We cannot account for children. Below roughly four years of age the parcel is not defended at all: bare encroachment produces assertion in under 3% of approaches, at any bearing and any radius we tested, and the boundary function cannot be fitted because there is no step to fit. Nor can we find a first entry. There is no grant, no survey, and no moment at which title is taken; the estate is simply there, later, in an adult, and the register does not record how anyone comes to hold. We report this because it is what we found and not because it is consistent

with anything we have argued.

Three further limits bear on the strength of the claims. The custom surveyed is that of a single jurisdiction, and the magnitudes in §5.1 should not be transported. We have no non-human comparison, and the doctrinal apparatus is not obviously portable to a species that cannot be served with notice. And the instrument is blind by construction to a boundary that is never asserted: a holder who does not defend is indistinguishable, in our data, from a holder with nothing left to defend.

9 Conclusion

The space around a body is registered land. It has an extent, a proprietor, and a charges register; entries upon it are adverse or by licence; and rights over it accrue by long use and are destroyed by interruption. Occupation for long enough does not encumber the title. It ends it. None of this is taught, none of it is written down, and everybody executes it perfectly from somewhere in early childhood until they die.

Nobody has ever stood too close to you. They have been on your land.

Data availability. Silhouette-only encounter records, boundary fits, and the documentary coding frame are held by the Cadastral Working Party. Depth video is not released; it is a survey of persons.

Pre-registration. Primary analysis and the equivalence margin in (7) were lodged before Site 3 opened.

Author contributions. W.A. designed the survey. I.D. supplied the doctrine. H.S. built the instrument and holds that the parcel is surveyable. The Cadastral Working Party maintains the register.

Competing interests. None declared.

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